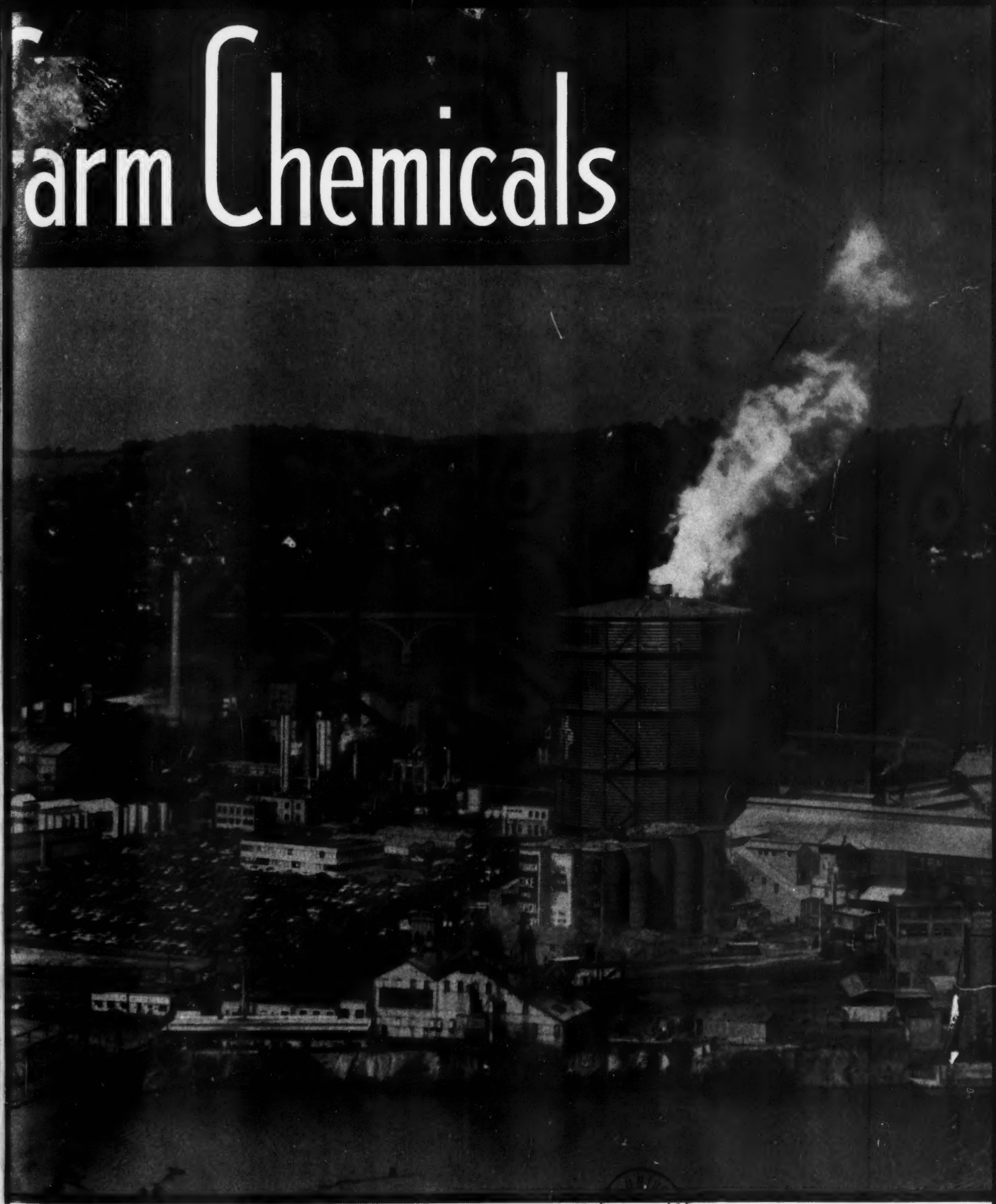

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In 1953

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In this issue . . .

Unsightly stains and short period of effectiveness have been two disadvantages encountered when using the insecticide lindane. Now the USDA has developed a lindane mixture containing chlorinated polyphenols which answers these problems. Read the exclusive story on the mixture by FARM CHEMICALS' Washington correspondent John Harms. It's on page 12.

Fertilizer mixtures may be dry and granular when they are manufactured but they often have become caked by the time they are to be applied. Illinois Farm Supply Co., of Chicago, found it could correct that situation by using surface active agents. Results are discussed on page 16.

A new field for pesticide manufacturers will be opened in April. That's the date set for marketing of the new moth repellent developed by the Bureau of Entomology and Plant Quarantine, which may save thousands of sweaters and other woolens from moth holes. Read about this opportunity for expansion on page 20.

"Safety Makes Dollars and Sense"—that's the title of a provocative article by W. N. Watmough Jr., of Davison Chemical Corp. Watmough doesn't overlook the humanitarian side of this important industrial problem; he merely emphasizes the business man's approach to a safety program. See page 25.

Entomologists are doing remarkable work in protecting crops from the ravages of insects. Read what's new in their research in the story of their recent convention. Page 31.

"From Coal to Farm Chemicals" . . . that's the best way to summarize the work of Pittsburgh Agricultural Chemical Co. For full details, turn to our picture story on page 36.

The recent sulfur shortage (or is it still going on?) had many ramifications in the fertilizer industry. For a description of one of these—the development of serpentine-fused phosphate in China—read the article on page 41.

It doesn't matter how good your products are if you can't sell them. If your company has sales trouble (and what company doesn't once in a while?) read Joe Culpepper's article on page 53.

One phase of fertilizer safety is the prevention of fires. For a detailed account of a good fire prevention program, read G. G. Blair's article on page 56.

farm chemicals

Formerly
American Fertilizer & Allied Chemicals
Established 1894
PIONEER JOURNAL OF THE FARM CHEMICALS INDUSTRY

Vol. 116 **JANUARY, 1953** **No. 1**

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Cover Story

That almost magical movement of coal to farm chemicals at Pittsburgh Agricultural Chemical Co. is done completely on Neville Island, Pittsburgh, Pa. Cover photo gives an aerial view of the complex organization. It is described in the article on page 36.

A magazine international in scope and circulation and devoted to manufacturers, mixers, and formulators of fertilizers and pesticides

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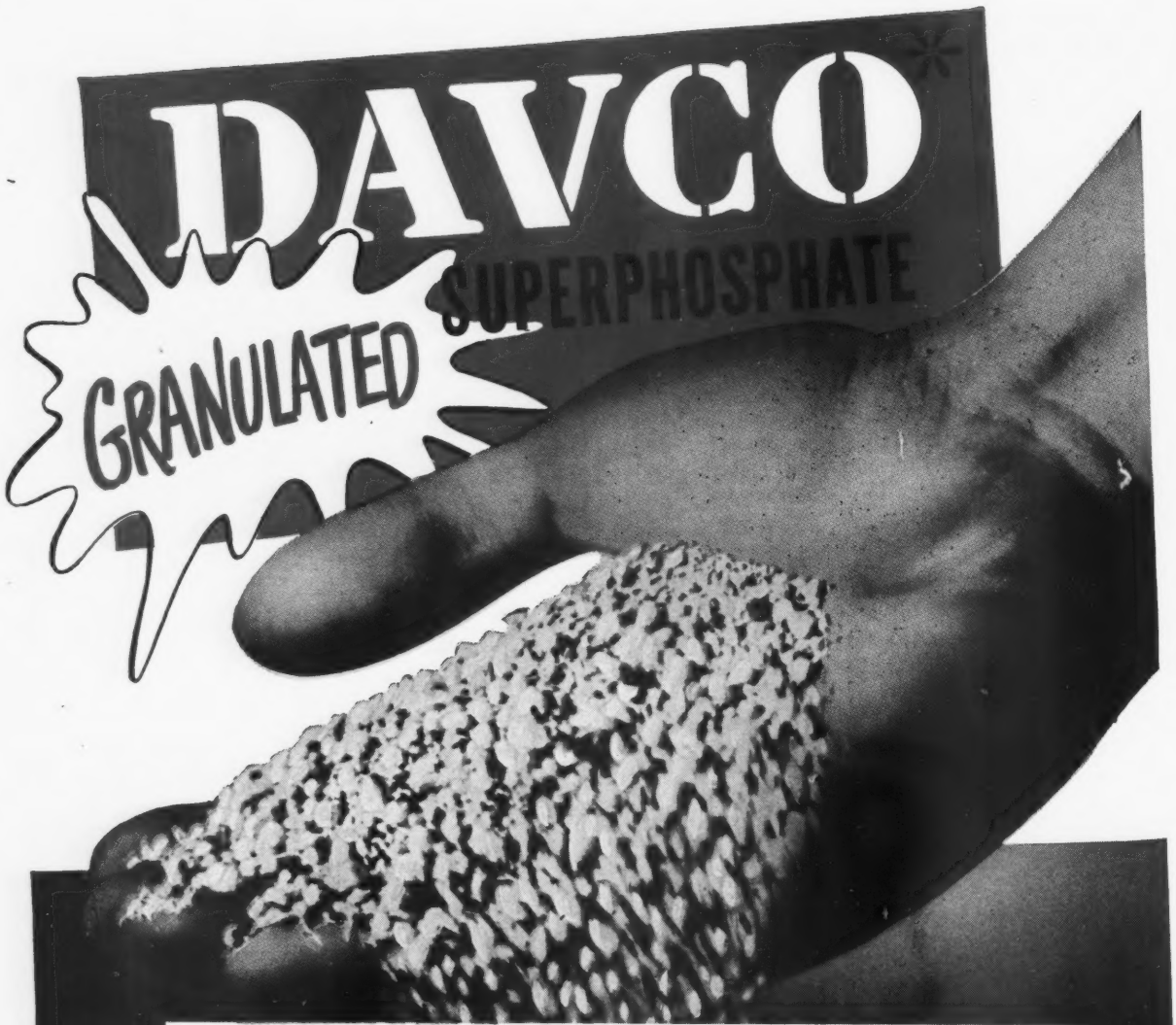

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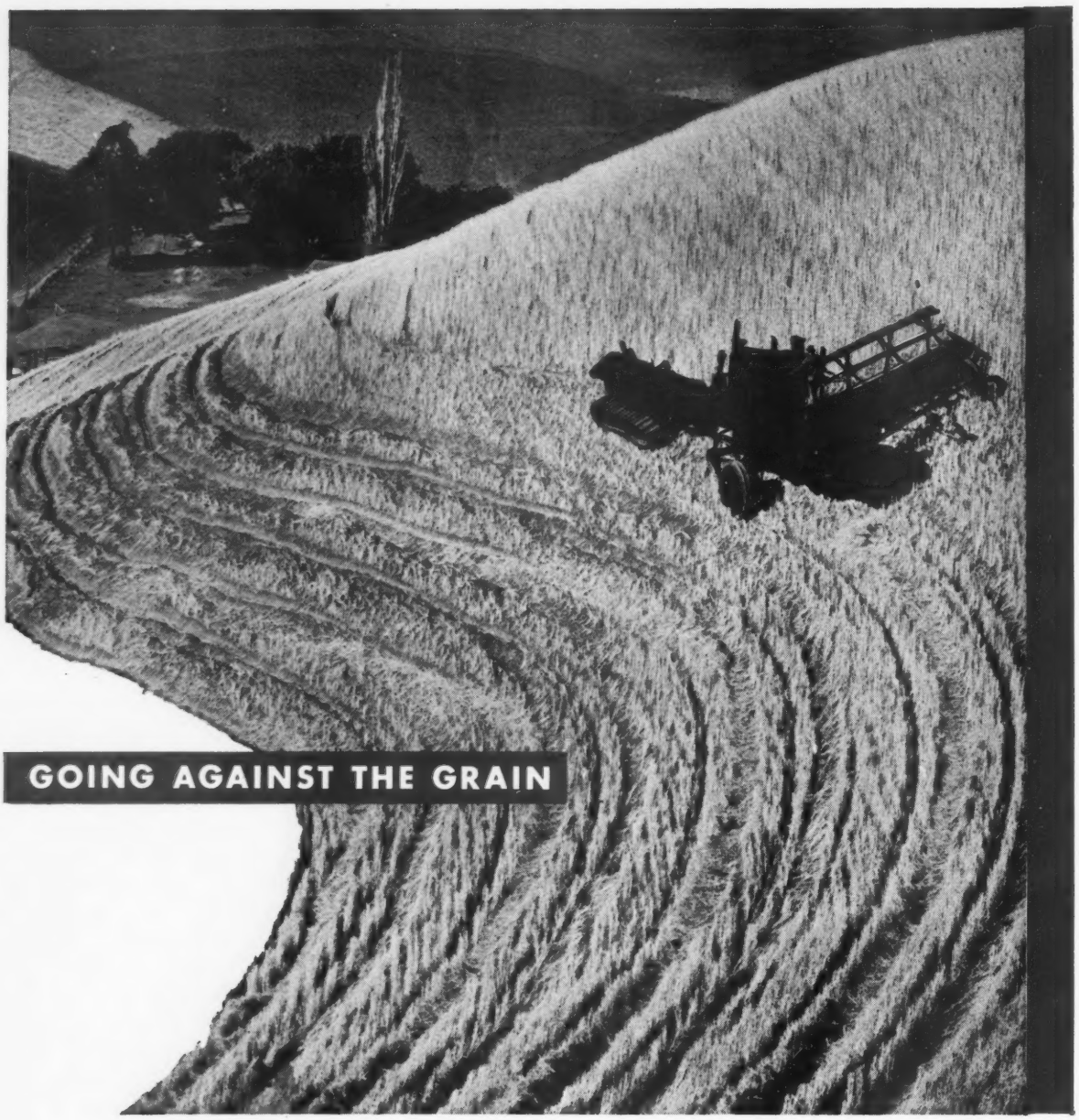

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farm chemicals facts

. . . Briefly Noted

Gates

Alfred P. Gates has been named assistant sales manager of the fertilizer division of **Virginia-Carolina Chemical Corp.,** C. Cecil Arledge, vice president of the company announced. A graduate of the University of Richmond, Gates joined V-C in 1950. He was transferred to the general sales department last year.

"Fertilizer and lime to the soil is the same as food is to man." That's the way Dr. Emil Truog, of the University of Wisconsin, described the value of plant food at a recent meeting of the Soil Conservation Society of America. Dr. Hugh Bennett, formerly head of the U. S. Soil Conservation Service, was named president of the society.

Charges against Planters Fertilizer & Phosphate Co. have been dropped by the National Production Authority. NPA charged last September that the company had unlawfully used 1,262 short tons of sulfur between June, 1951 and April, 1952. Company asked that charges be dropped, citing revocation of Order M-69 (concerning usage) on Nov. 5, 1952 and stating that NPA failed to disclose willful intent on the part of the company to violate the order. Dismissal was ordered by NPA Hearing Commissioner Charles J. Hilkey.

Old rockin' chair isn't getting A. L. Mehring, former senior chemist of the Bureau of Plant Industry, USDA. Only a few months after his retirement from USDA, Mehring was elected chairman of the American Chemical Society's Division of Soil Chemistry for 1953. He succeeds Dr. Samuel F. Thornton, of F. S. Royster Guano Co.

Antibiotics to protect trees from disease is a new development reported recently by Dr. John W. Mitchell, USDA plant pathologist, who described applications of streptomycin to plant stems for protection against several diseases. The antibiotics are effective, he said, because they have the ability to move from one part of the tree to another.

A wonder drug will go back to the soil as a fertilizer ingredient. That's the plan of Danish researcher W. M. Christensen, who has found that refuse penicillin has value as a plant food. It will be used in a Danish fertilizer plant now under construction.

You can borrow that excellent NFA film "Cash In on Corn" from the association, it announced last month. Requests should be directed to the National Fertilizer Association, 616 Investment Building, Washington 5, D.C., indicating several possible showing dates.

Dow Chemical bought the closed-down plant of Slagel Chemical Co. in Pine Grove, Mich., last month, paying $30,000 for the 25-acre site. It plans opening a new chemical plant in the area.

A newly organized sales research department will handle all statistical matters for Pennsalt, with E. M. Ott as manager. Markets for new products will be examined by the department, which also will study existing markets and services.

Two new sales division heads have been appointed by Pittsburgh Agr. Chem. Co. C. A. Paulson now heads the Memphis, Tenn. office and A. L. Wigger is in charge at Atlanta, Ga.

W. M. Sloane has been appointed sales manager for the newly-organized Mid-Western sales division of Arkell & Smiths. He will have headquarters in Chicago.

CALENDAR

Jan. 15—S. C. Fertilizer Conf., Columbia, S. C.

Jan. 20—Ga. Plant Food Educ. Society, Athens, Ga.

Jan. 21—Ga. Sec., American Society of Agronomy, Athens, Ga.

Jan. 22—Fertilizer Dealers Conf., Lincoln, Nebr.

Jan. 26-28—National Cotton Council, Dallas, Tex.

March 11-13—NACA, New Orleans, La.

March 15-19—American Chem. Society, Los Angeles, Cal.

Bradley

S. K. Bradley has been named vice president in charge of multiwall bag sales for **Union Bag.** The appointment was announced by Alexander Calder, president of the paper corporation.

Bradley previously was director of bag sales. The new vice president has been a member of the Union organization since 1938.

Roy Clinton Jones, of Fulton Bag, was awarded an honorary life membership in the Southern Seedmen's Association at the group's annual convention at Miami Beach, Fla., last month. The award was the first in the history of the association to honor an individual in a related industry.

Transferred from the Denver office of Julius Hyman & Co. Division of Shell Chemical Corp. to the Atlanta office was B. J. Fitzgerald. He will be concerned with experimental and development work on the company's soil fumigants, D-D and CBP-55.

New president of the Colorado Agricultural Chemical Association is Claine E. Titensor, manager of agricultural chemicals for Agricultural Processing Industries of Denver. He was elected Dec. 5 at a two-day meeting of the association in Denver. He succeeds Carl Dewey, of C. D. Smith Co.

Robert N. Conners of Chase Bag has been appointed to the advisory committee of the Executive Research Council. Conners is vice president and general sales manager of Chase. The Council works with the faculty of Northwestern University in studying community problems.

Minor elements have been shown to have a real influence on crop yields if intelligently applied, but an Illinois agronomist has cautioned against unwise application of the elements. T. C. Tucker said farmers of his state can benefit from using boron but needn't worry about other trace element deficiencies. Tucker warned of the danger of toxic effects in large applications of the trace elements.

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farm chemicals outlook

Report from Washington
by Fred Bailey & John Harms

Look for little change in attitude of Food & Drug Administration on the authority it thinks it should have over chemicals and foods. The change in Federal Administration very probably will not change the general trend of thinking in F&DA.

A bill is being prepared now for early Congressional consideration to bring about a general over-haul of present laws governing all chemicals used on foods. It is understood here to be along lines of the so-called Miller bill introduced in the last Congress, which embodied most of the proposals favored by F&DA.

Proposed measure would vest F&DA with broad jurisdiction over pesticides, fertilizers and chemical additives. It is understood that current division of responsibility would be ended . . . between Agriculture Department's authority to require registration of pesticides for interstate shipment and responsibility of F&DA over chemicals used in or on foods.

F&DA is expected to continue to push for this broad revision in the new Congress. On the other hand, USDA very probably will stick to its guns . . . fight to maintain the division . . . hold on to registration power granted under the Insecticide, Fungicide and Rodenticide Act of 1947.

But we don't expect any new laws to be enacted during the first session of the new Congress. Watch for a prolonged fight over proposed legislation cropping out of the Delaney committee report. It very likely will be talk and maneuver in 1953. By 1954, at the earliest, you can expect new laws . . . if then.

Federal payments for application of lime and fertilizer on farmlands will be a hot issue in this Congress. Agricultural conservation payments for these practices take about 40 per cent of the $250 million annual appropriation designed to encourage and help farmers use more soil-saving devices.

Payments to farmers for lime and fertilizer application, which cover only a part of the out-of-pocket cost, are coming increasingly under fire. These practices are deemed in many quarters as of only "temporary" benefit. Opponents of using federal funds to underwrite them say payments should be exclusively for more "permanent" things like dams and terraces.

Look for a slow shake-up in responsibilities of the various agencies of the Department of Agriculture under the new Administration. Many will have a bearing on the farm chemicals industry . . . affect your business channels . . . sources of information . . . contacts.

Changes that seem sure to come first are:

1. Stripping of conservation payment authority from the Production & Marketing Administration . . . shifting it elsewhere, probably to Soil Conservation Service.
2. All soil conservation activities of USDA consolidated under one agency, again probably under SCS.
3. Increased responsibility to the soil conservation districts . . . stress on decentralization of government conservation activities and other activities where possible. More conservation responsibility to Extension Service, Colleges.
4. Creation of a new agricultural products marketing help and study agency

. . . to be concerned only with problems of marketing crops. More stress on production research and research on marketing.

Farmers are hurting. Price-cost squeeze gets tighter. Price declines against rising costs have pulled all except a few commodities below parity . . . the established fair exchange price.

Farm prices have been going down at a rate of 2 per cent per month . . . prices farmers pay for production items show few signs of weakening. Little margin is left farmers between production costs and selling prices.

Selling of farm chemical industry products is tough now . . . will get even tougher as new year progresses. That's sum of opinion in Washington.

But it can be successful . . . farmers will buy if the approach is right. Best bet is believed to be hard-headed business approach: Scientific use of pesticides and fertilizer can cut per unit production costs. Many farmers must be more business-like from now on, and scientific, to survive.

Selling, dressed up, is Education. Many farmers, especially in the South, are not aware of what chemicals can do for them, consequently they are a vast untapped market.

National Planning Association, private and non-profit, says backward farmers have largely been ignored by farm educators . . . while expensive education programs are wasted on progressive farmers who don't have to be convinced.

"Show-how" method works well with "lower-income" farmers . . . but is "wasteful and unnecessary" for advanced farmers, the association finds.

Write for pamphlet titled: "How Farm People Learn New Methods," National Planning Association, 1606 New Hampshire Ave., N.W., Washington, D. C. 50 cents a copy.

Farmers are catching up with research . . . those farmers that are considered average or better. Production "ceilings" rapidly are being approached in corn, wheat, cotton, hogs, milk and eggs.

We're living on borrowed time. Farmers have used up a lot of the reserve of scientific developments in the last 10-15 years. Research is not keeping ahead of farm application . . . as it should.

That's essence of feeling in many scientific circles . . . expressed in dramatic terms by Byron T. Shaw, chief of USDA's sprawling Agricultural Research Administration, before the American Society of Agronomy.

Total farm production will level off . . . hit a ceiling imposed by research limitations . . . in not too distant future, Shaw warns. This, in face of increasing demands on farm production during the next several decades.

Insects, disease, soil deterioration, etc. combine to push down on farm production "as hard as research is pushing up."

Shaw says: "It will be for those we serve to decide if the quantity of research is to be increased. But it is for us agricultural scientists to decide that the quality of research will be improved . . .

Watch for increased funds for agricultural research to be granted by Congress this year. Little resistance is expected because of the critical nature of farm science to the well-being of the nation.

And as one top-ranking government official put it recently: The farm chemicals industry is confronted by opportunity and duty unexcelled . . . as the key industry of future America.

Footnotes to Science:

1. Systemics for livestock. Is this in the realm of possibility? USDA scientists think it is. Highly preliminary work now is underway in government laboratories to find out.

2. Housefly resistance to chlorinated hydrocarbon insecticides continues to baffle. But dairy barn laboratory tests show that TEPP, sodium fluoro acetate, sodium arsenate and sodium arsenite are effective in varying degrees where resistance has developed.

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3. FASTER PACKING. Are jam-ups a problem? Not with Bemis B-FLEX. No flapping inner-sleeve to slow down material flow.

4. UNIFORM WEIGHTS. You can hit your weights "right on the button." Stop over-packing.

5. CLEAN PACKAGE. Minimum sifting.

6. BETTER CUSTOMER SATISFACTION. No loose, torn sleeves to get into the farmer's drill.

And, of course, you get the added benefit of Bemis' crisp, bright, multi-color printing — the finest printing your brand can have on multiwall bags.

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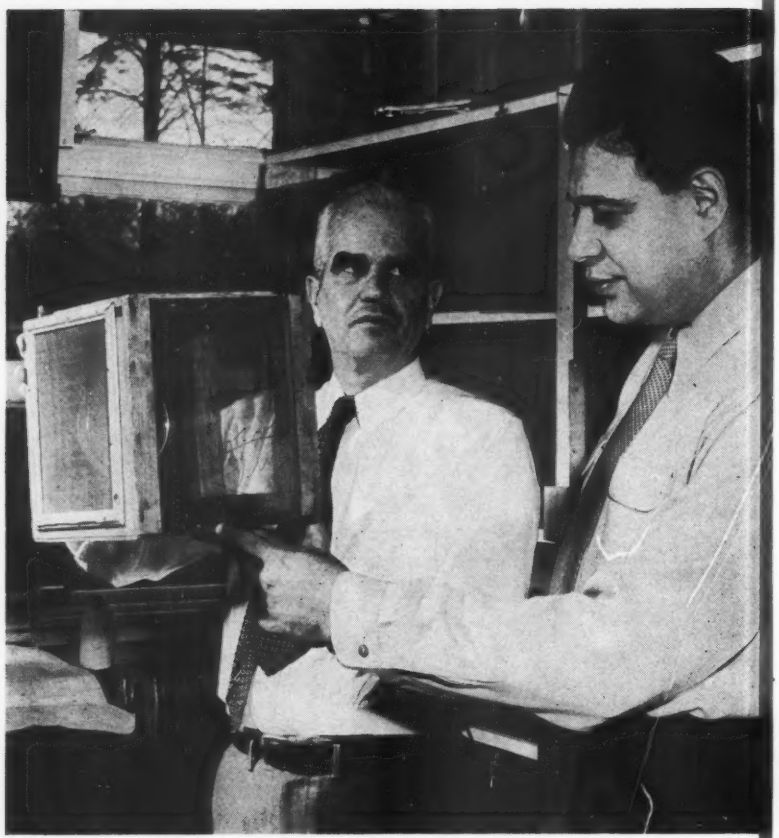


Effect on roaches of new lindane mixture with chlorinated polyphenols is studied by W. N. Sullivan, left, entomologist, and Irwin Hornstein, chemist, Bureau of Entomology.

Improved Lindane

By John Harms
Farm Chemicals
Washington Correspondent

TWO troublesome features about lindane as a pesticidal residue are its unsightly white, crystalline appearance and the relative rapidity with which it loses strength.

The power of lindane generally dissipates within a few weeks because of its relatively high vapor pressure (9.4 x 10–6 mm. Hg. at 20° C.).

These two features are obvious hindrances to wider usage of the pest killer.

A technical paper on the new lindane mixture was presented by Irwin Hornstein at the joint meeting of the American Association of Economic Entomologists and the Entomological Society of America, Dec. 15–18, 1952 in Philadelphia. For a complete article on the convention, see page 31.

But tests conducted at the Beltsville, Md. laboratory of the Agriculture Department's Bureau of Entomology and Plant Quarantine have shown promising results for overcoming the natural inclination of lindane.

The tests involve the mixture of lindane with chlorinated polyphenyls. Under laboratory conditions they show that the effective life of lindane can be extended by as much as 20 times its ordinary life through proper mixture with chlorinated polyphenyls. The unsightly appearance of the lindane residue is taken out almost completely by the mixture, leaving it invisible to the naked eye.

Wide Possibilities

This new development, it is believed, easily could revolutionize

not only the economics of lindane but possibly many other pesticides which have similar troublesome features limiting their economic value.

The tests at Beltsville were conducted by Irwin Hornstein, chemist and W. N. Sullivan, entomologist, of the Bureau of Entomology and Plant Quarantine. Hornstein and Sullivan conducted their research on ordinary houseflies and roaches.

Using Hornstein and Sullivan formulations, experiments already are underway in other directions. The USDA laboratory at Savannah, Ga., is conducting tests with lindane-chlorinated polyphenyls on cloth and paper equipment. At the Orlando, Fla., laboratory, studies are underway to determine the mixture's effect as a non-marring repellent on clothing.

Practicality Uncertain

The big question of practicality, however, still must be answered. While Hornstein-Sullivan laboratory tests indicate considerable success, the development has not yet gone through the field-testing state. The Department of Agriculture is waiting for the verdict of field tests, which are to begin soon, before issuing a recommendation on use of lindane-chlorinated polyphenyls.

After an exhaustive study of what substances might improve lindane staying power and appearance, Hornstein and Sullivan settled on a chlorinated polyphenyl because:

1. Chlorinated polyphenyls can be obtained as high-molecular-weight, noncrystalizing, film-forming materials.

2. There would be no tendency toward crystalization. Both materials are chlorinated hydrocarbons and it was believed lindane would be soluble in the polyphenyl.

3. The effective life of lindane probably would be extended because the vapor pressure of such mixtures is lower than that of lindane alone.

No Discoloration

4. The expectation that chlorinated polyphenyls would not discolor or change their physical characteristics with time.

TABLE 1—Tests Against Roaches to Measure Persistence of Lindane and Lindane-Aroclor 5460 Residues on Aluminum Masonite Surfaces

Concentration Mg./Sq. ft.	Appearance of residue	Mortality in 96 hours—Per cent									
		Aluminum surface Age of residue in days					Masonite surface Age of residue in days				
		2	10	30	60	90	2	10	30	60	90
		LINDANE									
50	White deposit which evaporated within 15 days	100	37	9	4	0	72	0	0	4	0
100	Heavy white deposit which evaporated within 30 days	100	100	36	3	0	100	19	0	3	0
200	Heavy white deposit which evaporated within 60 days	100	100	78	50	0	100	78	6	6	0
		LINDANE + AROCLOR									
50 200	Excellent	86	89	78	80	66	91	8	0	6	0
100 200	Excellent	94	67	76	82	82	100	17	12	2	4
200 200	Good	98	100	63	66	99	100	30	0	3	0
200 400	Good	95	—	79	96	95	—	—	—	—	—
		AROCLOR 5460									
200	Excellent	0	0	0	0	0					

Paints and polymerizable films were ruled out because paints form a hard skin impervious to lindane diffusion and polymerizable materials, in addition to discoloring, may continue to polymerize and eventually cause the lindane to crystalize out of the film.

Many Advantages

5. Chlorinated polyphenyls are inexpensive, non-oxidizing, of low volatility, noncorrosive to metals and resistant to fire and water.

Chlorinated polyphenyls are obtainable under the trademark Aroclor from the Monsanto Chemical Co., St. Louis, Mo.

The chlorinated polyphenyl used in the Hornstein-Sullivan tests was an isomeric terphenyl (ortho, neta and para mixture) containing approximately 60 per cent chlorine by weight and commercially available as Aroclor 5460. It forms a yellow transparent resin with a very low vapor pressure.

Several concentrations of carbon tetrachloride solutions of lindane and the chlorinated polyphenyl were prepared separately and mixed. Fifty to 200 milligrams of lindane per square foot of surface gave good insect control on nonporous surfaces.

Ratio of lindane to Aroclor 5460 was varied from 1:1 to 1:4. For most purposes tests show a 1:1 or a 1:2 mixture is satisfactory.

Formulations used in the tests are these:

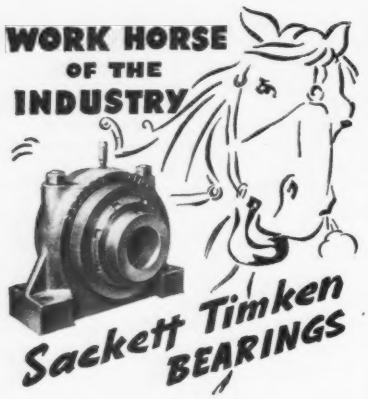
For application as a solution:

Lindane..... 5 parts by weight
Aroclor 5460.. 5 parts by weight
Carbon tetrachloride....750 parts by weight

For application as an emulsion:

Lindane..... 20 parts by weight
Aroclor 5460.. 20 parts by weight
Xylene.....100 parts by weight
Triton X-100. 3 parts by weight

To obtain a stable one per cent



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lindane emulsion, 143 parts by weight of the above concentrate should be mixed to 1857 parts by weight of water.

For use as a pressurized spray:

Lindane.....	5 parts by weight
Aroclor 5460..	5 parts by weight
Methylene chloride....	40 parts by weight
Freon 12.....	50 parts by weight

Test solutions were poured on aluminum and masonite panels each one foot square, with these results:

The rapid evaporation of the carbon tetrachloride reduced the pure lindane solution as a white deposit; the chlorinated polyphenyl as a hard, transparent residue and the mixture as a clear residue with tenacity and a slight tackiness. Panels with the various residues then were placed in a horizontal position and kept at summer room temperature (70° to 100° F.) for three months.

Roach Test

The roach-test insects used were large nymph and adult *Periplaneta americana* (L.). After 2, 10, 30, 60 and 90 days, 15 roaches were confined for two hours under each of two petri dishes inverted over each test panel.

The roaches thus were exposed to the contact and fumigation action of the three residues on the test panels. They were transferred then to observation cages and held for four days.

Comparative results were these:

The kill-life of a lindane residue was shown to depend upon the amount of lindane used—measured by a 50 per cent or better kill of roaches on an aluminum surface.

A lindane residue of 50 mg. per square foot was effective under summer conditions for fewer than 15 days. A residue of 100 mg. lasted 30 days and of 200 mg., 60 days. Those were the periods during which the white deposit was visible.

Longer Action

When lindane was mixed with the chlorinated polyphenyl, the effective life was greatly increased. For example, on 90-day residue, a 66 per cent kill was obtained with a 50 mg. lindane mixture with 200 mg. of chlorinated polyphenyl per square foot.

Residues from 100 mg. of lindane plus 200 mg. of chlorinated polyphenyl per square foot increased the kill to 80 per cent. Residues from 200 mg. of lindane plus 200 mg. of chlorinated polyphenyl increased the kill to 90 per cent. The residues in all cases remained transparent, tenacious and only very slightly tacky.

Long Potency

On houseflies, an 18-week old residue of 25 mg. lindane plus 50 mg. of chlorinated polyphenyl on glass and aluminum surfaces gave 100 per cent kill when flies were exposed for 10 minutes. Although the test lasted only 18 weeks recent tests show that several weeks later the mixture still was killing flies.

The tests showed that chlorinated polyphenyls used alone on aluminum surfaces caused no mortality.

On a "just to see what it would do" basis, Sullivan sprayed a lindane-chlorinated polyphenyl mixture onto leaves of a willow tree. After more than two months, the residue continued to kill house flies.

This test showed that the toxicant holds firmly to the surface of the treated leaves and the coating remained potent regardless of weather. Preliminary inspection also showed that the willow leaves were not injured by the application.

Persistence Increased

Evaluation of the tests shows that persistence of lindane as a residue was greatly increased by addition of a film of chlorinated polyphenyl.

The lindane in the film stayed in solution and acted as a reservoir for continued effectiveness.

As the surface lindane evaporated, it was replaced by a steady diffusion of "reservoir" lindane to the surface.

Coupled with this longer effectiveness, the scientists found, was the added advantage the mixture had in regard to stains and discolorations.

Surface-marring white deposits were forestalled because the lindane remained in solution. ◆

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Are your NPK mixes caking? Maybe you should try using surface active agents to

James E. Seymour, chief chemist at Illinois Farm Supply Co. plant at East St. Louis, Ill., who conducted first experiments using surface active agents as a fertilizer, works with a fertilizer batch in the company laboratory.

Keep Your Fertilizer *Free Flowing*

Farm Chemicals

Staff Report

AN EXCELLENT method for fertilizer manufacturers to prevent their NPK mixtures from caking was described recently.

In addition to preventing caking, the new process speeds reactions and cuts manufacturing time.

Fertilizer personnel long have been troubled with the problem of products which tend to form large lumps and cake in the bag, making application by the farmer a troublesome task.

One solution to the problem is the increasing use of granulation techniques to make the plant food free flowing and easy to handle.

Now attention has focused on the use of surface active agents to do the job. The use of such agents and their effect on mixed fertilizers was described by James E. Seymour at a recent meeting of the American Farm Research Association at Osage Beach, Mo.

Company Uses Surfactants

Seymour is a member of the Illinois Farm Supply Co., of Chicago, which considers as standard operating procedure the use of surface active agents in all N-P-K fertilizer mixtures at its East St. Louis plant.

According to Seymour, surface active agents can do some really amazing things to fertilizer mixtures. Following are some of the advantages he outlined:

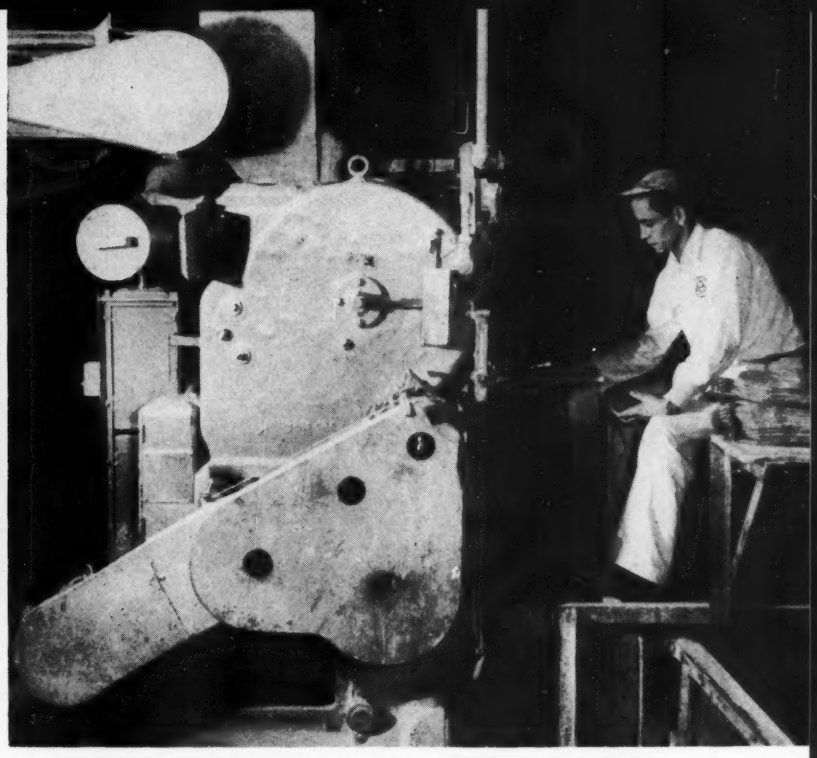
1. Less solvent medium is needed.
2. Higher initial reaction temperatures are possible.
3. Reactions are speeded up.
4. Complete reaction is possible in most instances.
5. The "salting out" effect in packaged products can be greatly minimized.
6. Cost of the treatment is attractively low.

Explanation for the advantages is found in an analysis of surface tension and the agents which are employed to reduce it. Tendency of a substance to contract to the smallest possible area under existing circumstances, caused by the intermolecular attraction of the molecules in the surfaces behind it is a simple definition of the phenomenon.

Reason for Effectiveness

A surface active agent, as Seymour explained it, is a substance which alters or modifies surface forces.

Photo shows how free-flowing mixtures are when they contain a surface active agent.



Workman uses a valve packer machine which fills 14 80-pound bags a minute. Free-flowing fertilizer is fed by conveyor.

Hence a more intimate contact between the liquid and solid phase and a better penetration of the solids by liquids is obtained in the fertilizer ammoniating and mixing process.

Illinois Farm Supply started experimenting with the agents in July, 1951. Research with various types of surfactants was completed in the next two months and a surface active agent was employed in plant operations that October.

Agent used by the company is Monsanto Chemical Company's Santomerse No. 1. It was chosen, Seymour said, because of its proximity, availability and cost. The substance is an alkyl aryl sulfonate type, anionic surface active agent.

Illinois Farm Supply made up fertilizer mixtures with varying analyses, using no Santomerse in the control batches and .05 per cent in others, with different percentages of moisture. In each case the mixture made with the agent displayed less tendency to cake and was in better condition than the control.

Proportional to Amount Used

Seymour reported that degree of caking had a tendency to be proportional to the amount of active ingredient contained in the respective samples. (Because the agents concentrate at the surface, a small amount usually is effective.)

In a longer range testing program, all grades of N-P-K fertilizers manufactured with Santomerse No. 1 at the East St. Louis plant in 700–750 ton quantities were checked for condition at various dates after bagging.

Data on 10 batches manufactured throughout the year show all in "good," "excellent" or "perfect" condition.

For other manufacturers who may be contemplating use of surface active agents in their products, these additional facts will be of interest:

1. Curing time is reduced by the agents.
2. In tests made by Illinois Farm Supply, anionic agents were found to be more economical than cationic or non-ionic types.
3. Most efficient formulation at the East St. Louis plant is .05 per cent Santomerse No. 1, or one pound of the material per ton of mixture.
4. Higher ammoniation rates are possible when a surface active agent is incorporated. ◆

This graphic photo shows the with (right) and without of surface active agents in NPK grades of fertilizer.

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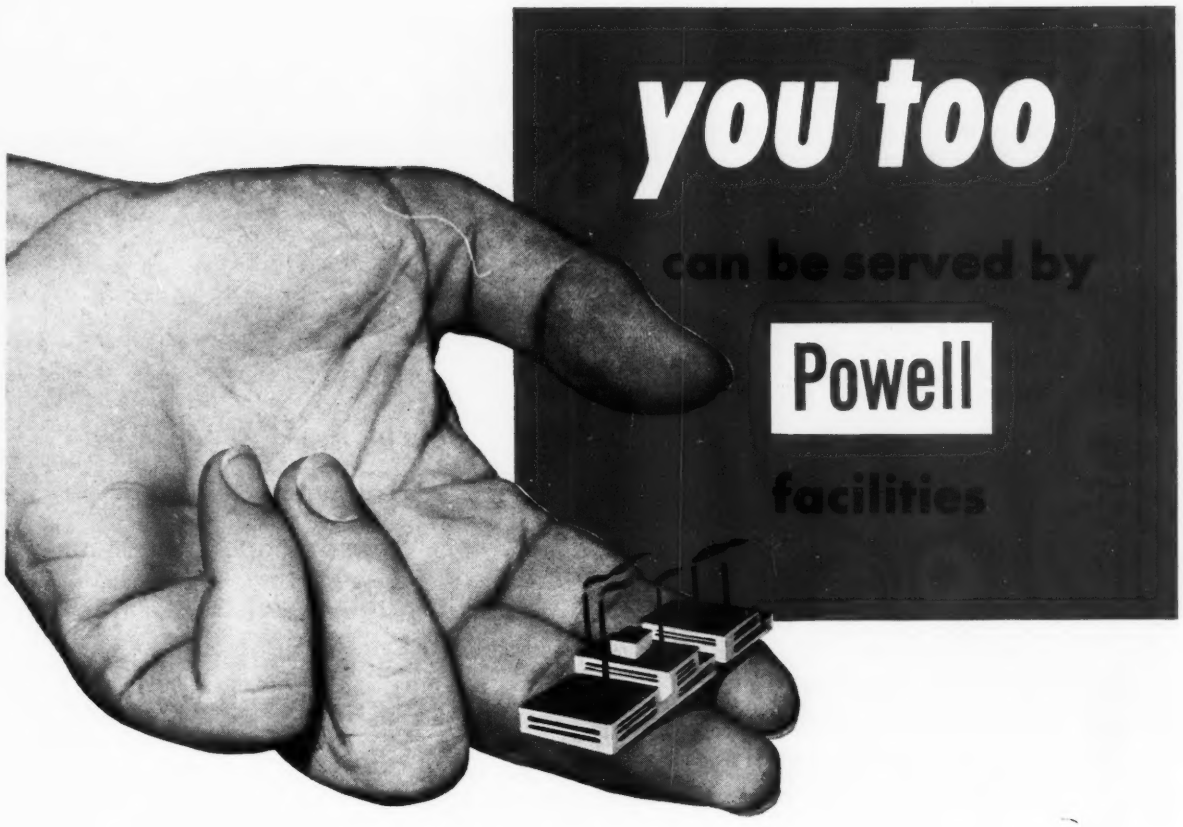

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LOOK TO POWELL...FOR CONSISTENT, TROUBLE-FREE QUALITY

The frown on this housewife's face may be replaced by a smile by this time next year if the new moth repellent EQ-53 does all that is claimed for it. It is added to water before washing clothing.

In April another field will open for pesticide manufacturers, but you better get ready now.

Moths Beware!

By Farm Chemicals
Washington Correspondent

YOU will be hearing a great deal about EQ-53 from now on. It's a new method of treating washable woolens in the home against moth and other insect damage during summer storage. And it promises to be a real money-maker for members of the chemical industry who are able to go into its manufacture.

EQ-53 is the brain-child of Hamilton Laudani of the Savannah, Ga., laboratory of the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture. Laudani and his associates developed the idea and tested it over a two-year period before announcing EQ-53 at the Chemical Specialists Manufacturers' Association December meeting in New York.

DDT Mixture

With EQ-53, essentially a mixture of the insecticide DDT, housewives can mothproof blankets, sweaters and other washable woolens just by pouring a few spoonfuls of the solution into the washing machine while the clothes are being washed. EQ-53 mothproofing can be accomplished in nearly all home machines or the material can be used in a wash basin or tub.

After that, it's merely a matter of hanging the clothes up to dry and then storing away.

Tests show that for each pound of woolens being washed, only about two teaspoons of EQ-53 added to the water of an average-sized washing machine thoroughly moth-proofs the fabric with DDT.

Woolens treated thus with EQ-53 then stored during the tests were completely protected against the feeding of the larvae of both clothes moths and carpet beetles for more than a year.

Bureau entomologists believe commercial EQ-53 will be relatively low cost when it becomes available to the public. It is safe for home use, requiring only the normal precautions necessary in handling any insecticides.

On infant and baby clothing, however, the Bureau recommends that the clothing be dry-cleaned after the storage period, before wearing, as an added precaution.

The Bureau of Entomology and Plant Quarantine is releasing the formulation and specifications to the industry now so formulators can prepare it and have it on retail shelves by the time Mrs. America is ready to moth-proof and store washable woolers for the summer—and when she is ready for something new by way of mothproofing.

In releasing the details of EQ-53 to FARM CHEMICALS, the Bureau requested that the chemical industry be asked to refrain from making public announcement of industry plans for EQ-53 before April 18.

The Bureau said: "We request industry to withhold until April 18 any public advertising it may plan."

Information Released

However, "to industry members who formulate and distribute household insecticides, the Bureau will, upon request, provide information on formulation, label statements and directions for use."

There are two obvious reasons for this Bureau request:

1. To give the industry a little boost in advertising the new product, and

532. forestall "cashing in" on EQ- potential by unethical fly-by-night outfits.

The Bureau feels that it would serve industry and the public best to have up-to-standard EQ-53 on retail shelves at the time demand for it actually develops. Unethical organizations easily could put inferior products on the market masquerading as EQ-53 and thus destroy public confidence in a promising new product.

Industry is to benefit from a wide USDA publicity campaign for EQ-53 beginning April 18. On that date the Department plans publicizing the moth-proofer through press stories, women's magazine articles, television and radio and a new USDA leaflet on mothproofing. Formulators of EQ-53 in the industry are advised to time their advertising for beginning on the same date—no earlier.

Use Brand Names

Formulators who go into EQ-53 production will be permitted to use their brand names, as "John Doe Brand of EQ-53."

The mothproofing treatment re-

New moth repellent, EQ-53, is measured out by housewife before washing woolens. It was developed at BEPQ laboratory in Savannah, Ga.

After a few spoonfuls of EQ-53, containing a DDT mixture and a solvent, is added to wash water, woolens can be given easy moth protection.

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quires the use of a DDT emulsifiable concentrate which the Bureau calls EQ-53.

Treatment requires the use of a DDT emulsifiable concentrate—with proper selection of emulsifier and solvent. A DDT emulsion is formed when a small amount of the concentrate is added to the wash water. There is a selective pick-up of DDT from the emulsion to the wool.

The type of solvent and emulsifier used in the concentrate have been carefully selected to insure proper functioning of this selective pick-up, safety to the user and lack of injury to woolens being treated.

Formulation

The percentage mixture is DDT, 30 per cent; emulsifier, 10 per cent and solvent, 60 per cent.

Emulsifier—The emulsion should be a non-ionic, polyhydric alcohol or alcohol ether type. In the developmental works, Triton X-100 was used, although other emulsifiers of the above type may be found to be equally effective.

Solvent—The solvent should be an aromatic hydrocarbon with the following properties:

1. Flashpoint: 115° F. minimum by Cleveland open-cup method.
2. Initial boiling point: 300° F.
3. Per cent at 330° F.: 50 minimum.
4. Per cent at 350° F.: 90 minimum.
5. Final boiling point: 370°.
6. Specific gravity: 0.871.
7. Color: Saybolt chromometer 25 minimum.
8. DDT solubility: Must dissolve 35 per cent technical DDT (melting point 108–109° C.) on W/W basis at 30° C.

In developmental work, Solvesso 100 was used as the solvent. Other solvents complying with the described physical properties undoubtedly would be equally suitable.

Labeling

The Bureau of Entomology and Plant Quarantine is offering industry an additional service on labeling. The Bureau has cleared EQ-53 and its proposed labeling with the Insecticide Division of the Production and Marketing Administration, USDA, to speed up approval of industrial applications.

Formulators following the Bureau's proposed label likely will find little difficulty in obtaining Insecticide Division approval.

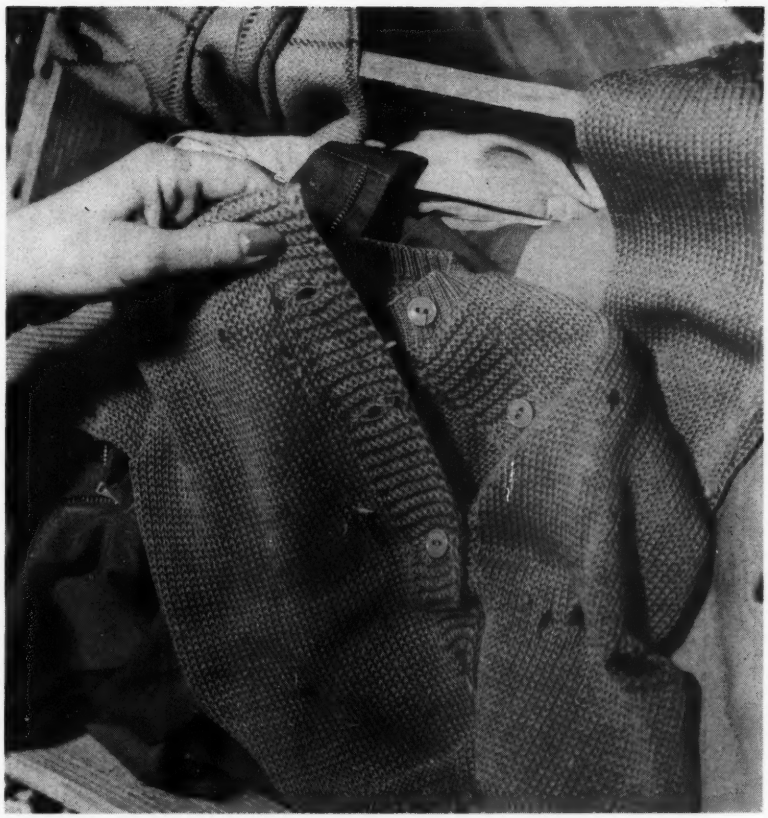
Labels, of course, should have a statement of ingredients, carry any caution notices necessary and outline directions for use.

Further details on EQ-53, including labeling, may be obtained by writing the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, Washington 25, D. C.

Although the announcement concerning EQ-53 received much attention at the Chemical Specialties convention other reports were of wide interest to the big group of delegates attending the meeting in the Hotel New Yorker Dec. 8 and 9.

A highlight of the convention was a symposium on fog machines for dispensing insecticides. It was concerned with desirable characteristics of formulations and interior and exterior applications.

E. J. Campau of Standard Oil Co. (Indiana) was moderator. Speakers included W. B. Stevens, Socony Vacuum Oil Co.; Dr. J. V. Osmun, Dept. of Entomology, Purdue University; Dr. E. J. Hansens, Department of Entomology, Rutgers University and F. K. Harder, Harder Exterminating Co.



Moth-eaten sweaters like this may become a thing of the past after pesticide manufacturers put EQ-53 on the market sometime after April.

Labeling Problems

The formidable task facing a technical man in the problem of labeling pesticides was discussed by Sanford J. Hill, of Du Pont. He outlined labeling laws and requirements in various areas and mentioned the difficulties connected with the job of labeling a chemical specialty accurately and within the bounds of law.

Techniques of introducing the development chemical were aired by J. V. Miller, of Atlas Powder Co. He outlined the problems involved in such an introduction and gave his recommendations for solving them.

"New Developments in Rodenticides" was the subject of a talk by Karl Paul Link, Dept. of Biochemistry, University of Wisconsin. ◆

ACCELERATED FERTILIZER CONDITIONING

WITH TENNESSEE'S

SUL-FON-ATE AA9!

Our own fertilizer plants have been experimenting with wetting agents to reduce curing time and prevent secondary caking of mixed fertilizers. SUL-FON-ATE AA 9 has been found to be very effective in this application and it is now being regularly used by our plants.

Tennessee's SUL-FON-ATE AA 9 is an alkyl aryl sulfonate containing 90% active ingredient. It is a powerful wetting and penetrating agent that promotes better contact between the fertilizer components. This intimate contact reduces the time required for completion of the reaction.

UNTREATED

TREATED

These pictures show the effect of the addition of Tennessee's SUL-FON-ATE AA 9 to one of our more troublesome formulas: Four units of nitrogen came from solution and the other two from sulphate of ammonia. Both samples were cured for 4 days and then bagged. The bags were stacked for 10 days and the above samples were taken from the bottom bags.

METHOD OF APPLICATION

Since manufacturing processes vary widely in fertilizer plants, the best method of introduction into the mixer must be determined at each plant. Our plants prefer to distribute it on the conveyor belt feeding into the mixer. In the pictures shown SUL-FON-ATE AA9 was added to the potash. It is not necessary to make any changes in operating procedure.

For further Information, please contact

ORGANIC CHEMICALS DIVISION

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One of the pioneers of fertilizer safety says

'Safety Makes Dollars and Sense'

By W. N. Watmough, Jr.
Vice President, The Davison Chemical Corporation

THE title "Safety Makes Dollars and Sense" may sound a bit flippant—a catch phrase just to attract attention.

Believe me, it has not been used with such a thought in mind. It seems to me that it is a businessman's approach to a paramount business problem. If management approves and puts into active force any policy that doesn't make dollars, then that policy does not make sense!

Do top men in management approve appropriations for new plants or modernization of existing plants or individual pieces of equipment before they are convinced that that move will earn dollars?—Will show a good return on the investment? Of course not! I say that if after considering a common sense, well rounded safety program and health plan, industry personnel are not convinced that the cost of the plan or the investment in it will pay off —I say—don't buy it!

Does the reputation in the community of your plant as a safe place to work, as a healthful place, as a house well kept attract good employes? Will it cut down turnover? Will that make for lower maintenance costs, increased production rates, improved product quality?

W. N. Watmough

If you don't think so, just keep right on saying to yourself, as many of us in the fertilizer industry used to say not so very long ago—"Accidents or lack of accidents are a matter of luck—we are a seasonal industry—we use a great deal of low grade labor—we can't hope to be in a class with big, modern industry. It's just a frill, we can't afford it!"

If we are honest with ourselves we can't afford not to spend that top management effort and money to be as good or better than other heavy industries.

We at Davison have witnessed in the last four years a very practical demonstration of how a living, driving, sincere investment in safety can earn dividends not to be sneezed at—$82,000 retrospective return insurance premium on a premium that already reflected a good experience.

Now, let's take a good look at the fertilizer industry. Volume has been increasing at the following breakneck speed.

Fiscal 1939—$280 million
Fiscal 1945— 560 million
Fiscal 1951— 900 million
Fiscal 1952—Expected over $1 billion.

The Department of Agriculture tells us there are no more acres to feed a population increasing at the rate of 2½ million each year.

But if we are honest with ourselves, we must admit that the fertilizer business in this rapid expansion has not improved its safety methods at the rate it has improved its process of manufacture and its equipment to meet its bulk handling problem of some 60 million tons through its plants. Let's look at the record:

	1940	
	Fertilizer	Chemical
Frequency	28.3	9.15

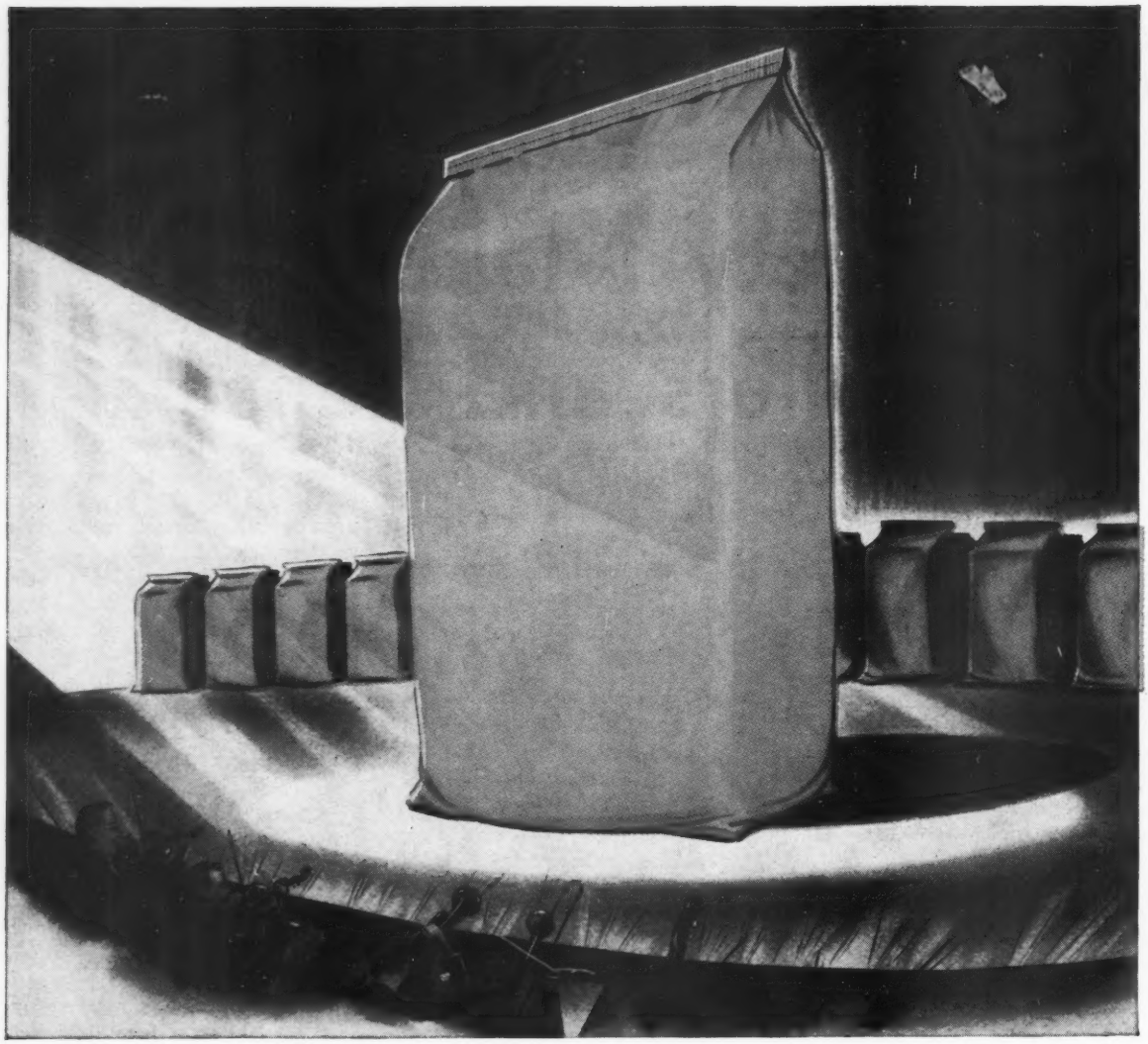
	1950	
	Fertilizer	Chemical
Frequency	23.8	5.82

This is not true of all companies. Many of the 850 have tackled the job with considerable success. The Davison figures for its fertilizer plants only are as follows:

	1940	1950
Frequency	36	5½

The first organized safety movement on a national scale started 40 years ago when a group of farsighted men met in Milwaukee to talk about safe practices in industry. Out of that meeting was born the National Safety Council. They

As presented at the 26th Southern Meeting, The National Fertilizer Association, at the Roney Plaza Hotel, Miami Beach, Fla., Nov. 19–21, 1952.



PUT *Your* PRODUCT OUT FRONT

V-C Multiwall Bags not only stand up under rough, tough treatment, they also help you sell. Well-designed, expertly printed bags create the kind of impression that builds customer confidence and good-will for your products and company. They help put your product out front.

Ask V-C, manufacturer of quality bags since 1898, to help you improve and modernize your trade design on your multiwalls. Find out about V-C's expert printing. Learn how V-C's top-quality materials and careful construction mean multiwall bags of greater strength and durability at surprising economy.

V-C Multiwall Bags are available in the following styles: sewn open mouth, sewn valve, sewn valve with sleeve or with tuck-in sleeve.

Discuss your bag requirements with a V-C representative.

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have just held their 40th National Safety Congress at Chicago.

There was a separate fertilizer section on that program for the first time just last year. It took 39 years, but we made it!

Of course, many of us have been members of the Council for years; have supported it and made real use of its assistance and information. But when we as an industry tell the world where we stand, all types of industry know we are part and parcel of a worth-while cause.

Fifteen thousand people attended that last meeting.

Just a little over two years ago our safety man, A. B. Pettit, and two safety men from other companies, gathered one evening after a special meeting in Chicago. For sometime they had been deeply concerned about the terrific accident toll in the fertilizer industry, with all its consequent suffering and loss of life and limb, to say nothing of the high cost to the industry.

'Almost Impossible'

They had been told that it would be almost impossible to get top men in our industry to agree to take an active part in a national setup to promote and support with their dollars a safety program on a national basis. In spite of the apparent difficulties they were determined men and were successful in obtaining the support of some of the top men in the fertilizer and allied industries to form a committee to sell the National Safety Council on a separate fertilizer section.

On this committee were Dr. Russell Coleman, N.F.A. president and Paul Truitt, head of the American Plant Food Council, representing a very large section of the fertilizer industry. These two men rendered enthusiastic and vital support to the efforts of that committee with the result that at the National Safety Congress held in Chicago in October 1951, there was a new Fertilizer Section. The committee worked up a complete program and members in top management of the industry spoke at the first meeting.

A small attendance had been expected and a room to hold 50 people reserved. It was necessary when the meeting opened to move to one of the larger rooms because 240 members of the fertilizer industry turned up. The group included presidents of some companies, although naturally the majority were men directly responsible for safety in their respective outfits.

Frankly, this was amazing to me because I, like many others, who started out in the fertilizer business some 35 years ago, had a tough time convincing myself that our industry would show such a response. This year at Chicago the group held two afternoon meetings with a large and interested audience. I was fortunate enough to attend the last afternoon session and I must say that it was chock full of useful information well and enthusiastically presented.

You may well ask "What are the economics of this program?" "What can we gain by taking part?" "How does safety pay off?"

While humanitarian reasons should come first, I will first call your attention to the dollar sign. I am sure you are aware that the cost of compensation insurance ranges from approximately $1.50 in some states up to $6.77 in one state. The national average is approximately $3.50 per $100 of payroll. Take that average and calculate it against your payroll and you can see just how many thousands of dollars you are paying out for which you get no return.

You don't get the profit on even one bag of fertilizer for it. That is not the worst of it, however, for careful studies have been made which prove that for each dollar of compensation insurance cost you are paying out at least four dollars in indirect costs.

These costs include such items as the time lost taking the injured workmen for medical attention, the time lost by buddies of injured workman, the lowered efficiency of your crews, which invariably follows a bad accident, the production loss that accompanies the removal of a skilled workman from your crews and the cost of hiring and training new workmen. Another cost over and above the figure quoted is the economic loss to the injured workman. Sure he gets some compensation, but it rarely, if ever, even remotely approaches his earnings on the job. No one can live on workman's compensation so an employe whose injury keeps him from work becomes a charge on the community. Perhaps in a few cases some member of his family or a friend may be able to take up the slack—more often he must depend upon charity.

Some one has to foot the bill and you and I, or our companies must contribute indirectly to his support through charitable organizations or the workman and his family must suffer a lowered standard of living. Perhaps we won't have to foot all the bill but every case of this kind makes the injured worker and his friends supporters of the philosophy that our government must intervene to assure the security of injured workmen. You can't afford to pass this off lightly.

Then there are a lot of indirect benefits which accrue to you when your plant becomes recognized as a safe and healthy one in which to work. All of you know the problem we in this highly seasonal industry face in trying to get good workmen in competition with other industries which are less seasonal.

If your plant is known as a dangerous and unhealthy place to work you will have to hire from the very bottom of the barrel because the upper layer will prefer to work elsewhere.

Better Results

At best, you can't hope to do too well in your hirings for the peak season, but if you operate a safe and healthy plant, if your housekeeping is good, if you do your best at controlling dust and fumes and if you have decent welfare houses you will be able to hire much better and more reliable help than the plant that does not offer these advantages. Believe me, workmen today can be and are "choosey" and those who won't face up to this fact will pay through the nose for their failures.

Just a short time ago I heard a representative of a leading fertilizer manufacturer tell how his company through its safety program with the attendant emphasis on good housekeeping had reduced its fire loss ratio to 1/16 of one per cent over a 10-year period compared with 1¼ per cent for the industry. Doesn't that result show that the investment in their pro-

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gram made dollars and sense?

I can hear some of you asking why are Davison and other companies pushing this safety program so hard and giving it time and moral and financial support. If it is so good why don't we keep it to ourselves?

The answer is simple. Each of us suffers in some measure for the sins of the industry and likewise each of us stands to benefit from the healthy progress of our industry. Some of you have already learned the hard way that it pays to be a good neighbor in your community. How many of you have realized that if the industry is damned by the citizens of your communities that the good performances must share in part the resentment engendered by the bad?

Then too our industry is made up in a large part of comparatively small operators, who are unable because of their size to stand up entirely on their own records. They are perforce affected insofar as compensation and fire insurance rates by the experience of other operators.

Advice Sought

In our efforts to operate in a way to assure the safety and well-being of our employes and the people living in the vicinity of our plants, we have asked for and received advice and assistance from some of you and from many large companies operating in other fields. We would be selfish and ungrateful indeed if we ourselves were to refuse to help others less experienced, or smaller than ourselves. From the beginning we have been willing to help others in safety matters to the limit of our ability. Many have already gratefully received the proffered help. I particularly urge the larger operators who have not already done so, to lend a helping hand to others.

You may say, "We want to operate safely so tell us how you do it." If I were to talk all day I could never give you enough formulas to fit every need. The reason is that the safety program for a given plant must be tailored to that plant's needs.

It is the responsibility of our central industrial health and safety department to keep constantly abreast of the needs of each of our plants and to advise and assist each plant in formulating, developing and operating a safety program tailored to its requirements.

In the past five years I have seen a transformation in Davison's fertilizer plants from an accident frequency of 32 in 1946 to 5½ in 1950. In 1949, I saw our Curtis Bay Works at Baltimore and our Phosphate Rock Division in Florida win the National Safety Council's highest award, its "Distinguished Service to Safety Award." This was the first and only such award in the entire State of Florida up to that time and only one other manufacturer—and remember that I am speaking about every type of industry, not just chemicals—had ever received that honor in Maryland.

In 1950 we received that award again for our entire operations throughout the country, including fertilizer, mining and chemicals plants, and we repeated in 1951. No other multi-unit company, which utilizes nearly half of its man-hours in the production of fertilizer, has ever received this award on a corporate-wide basis. I don't say this to "toot our own horn" but as justification for my own enthusiasm.

By far the most accidents occur at home—not in industrial plants—but do you realize that the homes of industrial workers are many times as safe as the homes of others? That constant hammering of the importance of playing safe at the plant goes back home. We haven't a single factory that does not provide complete and modern change house and locker room facilities. That story goes home, too, making for cleanliness and health of the workers' families.

We are fully aware that injured employes and their families must pay the greatest price for accidents, not alone in pain but in economic loss. We lose money, too, but he loses proportionately more than we do and can afford it less. Therefore, the employe has the most to gain from safe operations. Because it was our belief that because the workmen had the most to gain from safe operations, they would jump at the opportunity to have an active part in the program, we gave them the chance and they have come through with flying colors.

We have 26 active safety committees, the number varying from one committee in the smaller plants to nine committees in our largest works. Again it is a matter of tailoring the program to the needs of the particular unit. Of these 26 committees, three are strictly management committees. The membership of the remaining committees is composed of at least 50 per cent hourly paid workers. In some cases the representation is 60 per cent hourly paid workers, 40 per cent management. Membership is rotated especially amongst the hourly paid group in order to give a greater number of employes a chance to participate.

Some Opposition

As you might expect, we had some management men who were opposed to this arrangement in the beginning. I am happy to report that today their misgivings have been proven fallacious and that they would be the first to defend the practice. Why not! Experienced working men know their individual jobs better than management can ever hope to know them. They have taken a keen interest in the correction of unsafe conditions and unsafe practices and have advanced a multitude of good ideas to promote safety. We owe them a debt of gratitude.

There are more than 800 fertilizer plants in this country, most of them small, employing only a few people, but in total they are more important than the establishments of larger concerns. Many are members of NFA. The small plant has proportionately a tougher job—one little accident throws its frequency record sky-high. But that small plant can beat the big one!

To all larger producers I say open your doors, as many of you already have, to the little fellow. Tell him how you are getting the job done. He probably hasn't a safety engineer but his superintendent can be one. To the smaller companies I say, join actively in the work of the National Safety Council, send your superintendent or foreman to the congress held in Chicago each October, or to the Southern Regional Meeting in Atlanta each spring. He will learn things there that, if he puts them to use in your factory, will make dollars for you. That makes sense, doesn't it? ◆

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Dr. E. F. Knipling, right, retiring president of A.A.E.E., greets Dr. Charles E. Palm, president of new organization.

Joining forces against the bugs . . .

Two Entomology Societys Merge

Farm Chemicals

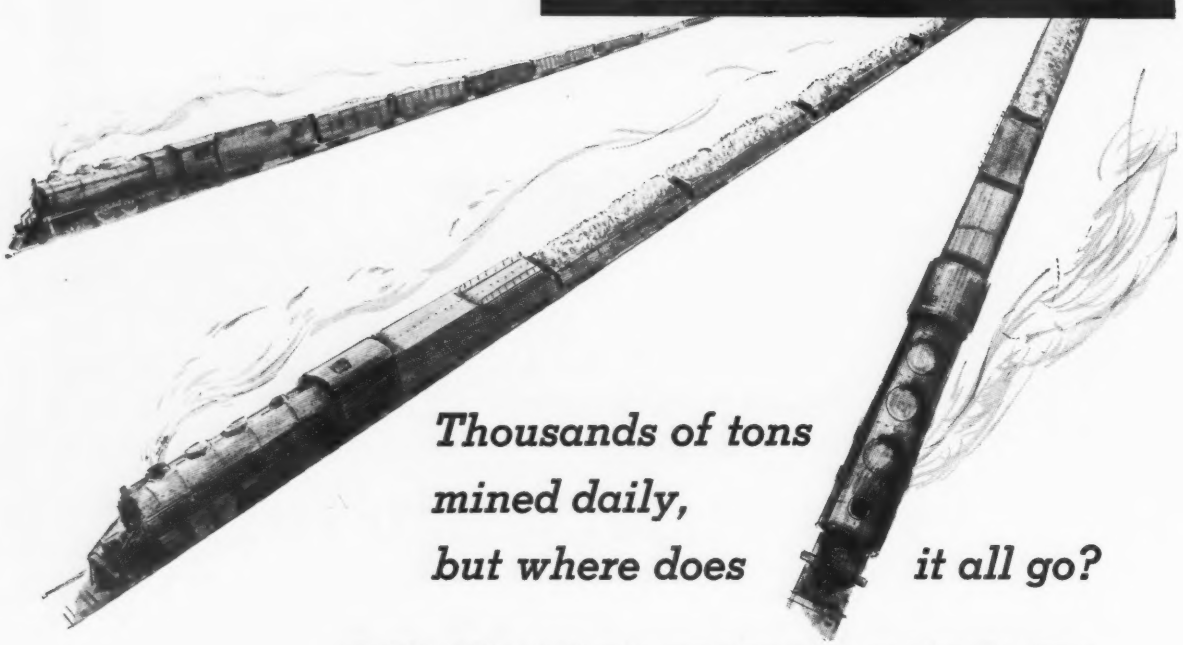
Staff Report

Dr. T. W. Reed, Dr. Richard D. Wessel and Richard B. Miller of California Spray-Chemical Corp. compare notes after one of the symposia.

ALTHOUGH the news of most immediate importance at the meeting of entomologists from all over the United States in Philadelphia last month was the merger of the two leading organizations there was much vital technical news on the continuing battle of science against insects.

The newly formed organization —called the Entomological Society of America—represents more than 4,000 members. It was created by the merger of the American Association of Economic Entomologists

Sulphur



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and the old Entomological Society of America.

The merger was effected during joint meetings of the organizations Dec. 15–18 in the Bellevue-Stratford Hotel.

President of the new society is Dr. Charles E. Palm, head of the Department of Entomology at Cornell University. Named president-elect was Dr. H. H. Ross of the Illinois Natural History Survey, Urbana, Ill. He will take over the top post in the organization next year. Until a permanent secretary-treasurer can be elected Dr. Ernest N. Cory, head of the Department of Entomology, University of Maryland, will fill the position temporarily.

Officials of the new organization said "a stronger, more closely-knit society representing entomologists in various fields of activity . . . presents a united front that can take an active and aggressive lead in the progress of this important science."

Read the FARM CHEMICALS *exclusive article on the new lindane-chlorinated polyphenol insecticide mixture on page 12 in this issue. Complete reports on other papers presented at the convention are scheduled for future issues.*

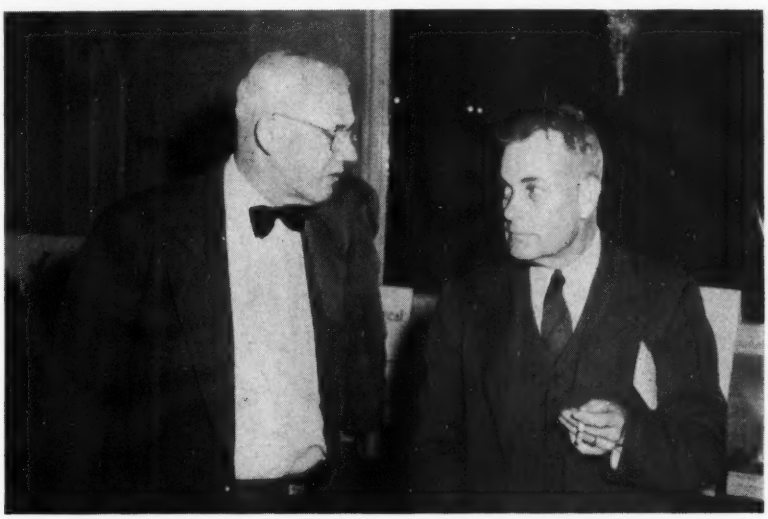
First annual meeting of the society was set for Dec. 7–10 in the Biltmore Hotel, Los Angeles.

More Than 700

But to the more than 700 members of the two organizations attending the conventions, the big news was on other fronts. It was presented in the formal talks and the symposia which ran concurrently, three at a time, in the various meeting rooms.

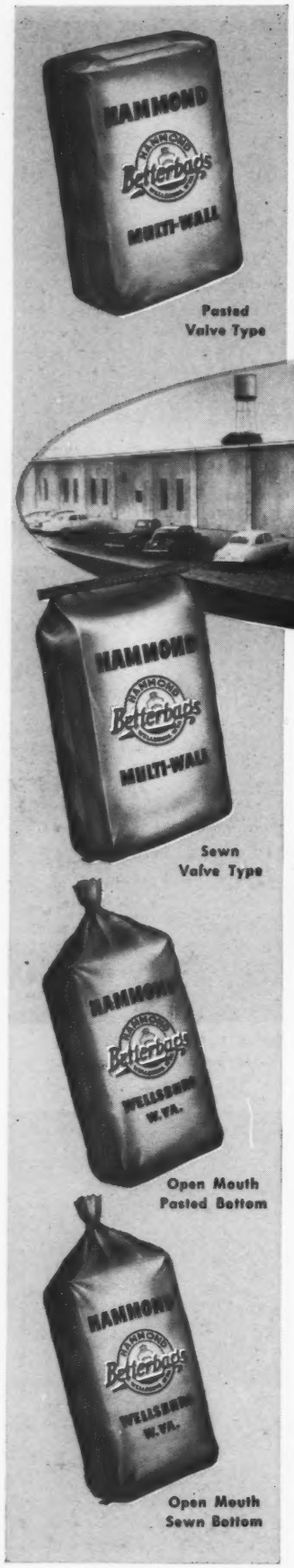
Much interest was aroused by the report of Irwin Hornstein on work by the Bureau of Entomology and Plant Quarantine with the insecticidal mixture of lindane and chlorinated polyphenols for longer effectiveness with no unsightly residue stains. (For the full story on the lindane mixtures, see FARM

From left: Randall Latta, Henry H. Richardson and J. W. Bulger of the Bureau of Entomology and Plant Quarantine meet at the convention.



S. W. Frost, Penn State College, left, and Dr. B. F. Driggers, Rutgers University, relax in the lobby of the Bellevue-Stratford Hotel.

B. V. Travis, Cornell U., center, meets with Carl Mohr and G. H. Bradley of Public Health Service.



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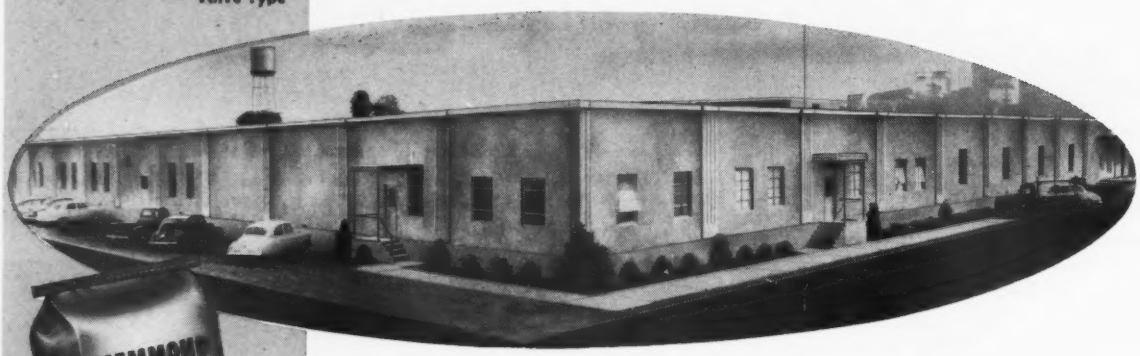

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CHEMICALS' exclusive article on page 12.)

Another subject of interest, that of chemical baits as a possible answer to control of insecticide-resistant flies, also came in for a good deal of discussion.

Describing research and testing of the baits was J. B. Gahan, who, with several other USDA scientists, performed experiments with the materials.

Baits Effective

The baits proved more effective against resistant flies than any other treatment tried during the last three years, according to Gahan's report. Toxic chemicals used in the tests included TEPP, sodium fluoro acetate, sodium arsenate and sodium arsenite.

In another discussion on resistance of insects—this time that of mites to parathion—E. J. Newcomer of the Yakima, Wash., station of the B.E.P.Q., told of tests with DMC, EPN, malathon, R-242 and 88R as new chemicals which proved to be effective substitutes.

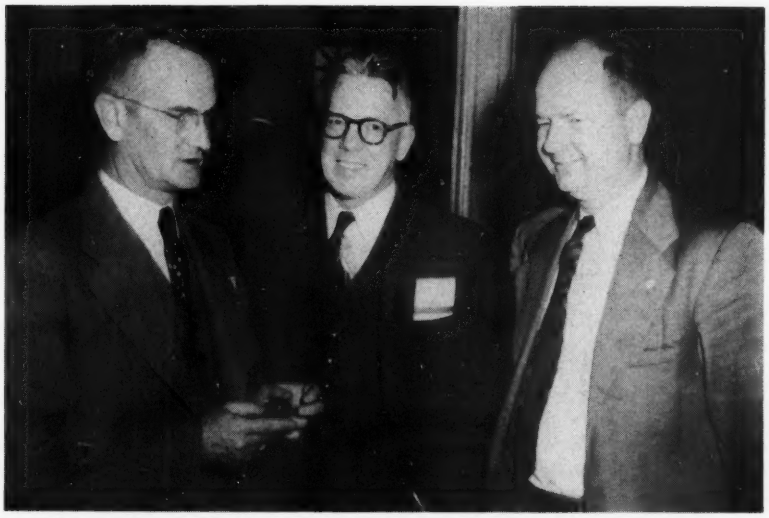
Report on EPN

The effectiveness of EPN and other organic phosphate insecticides on resistant mosquitoes in California was reported by Dr. A. W. Lindquist of the USDA.

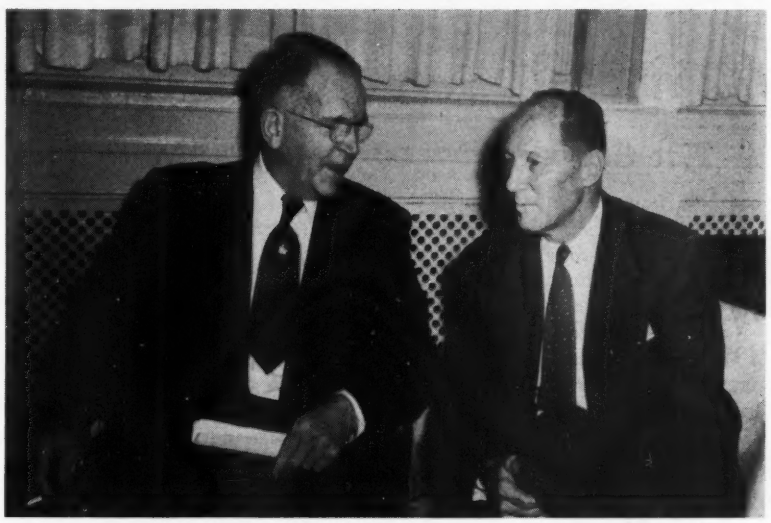
Scores of other papers on research in insect control, some of which will be presented in complete detail in future issues of this magazine, were presented at the four-day convention, which had meetings scheduled from early morning to late in the evening.

Attendance at the sessions was very good throughout the four-day convention.

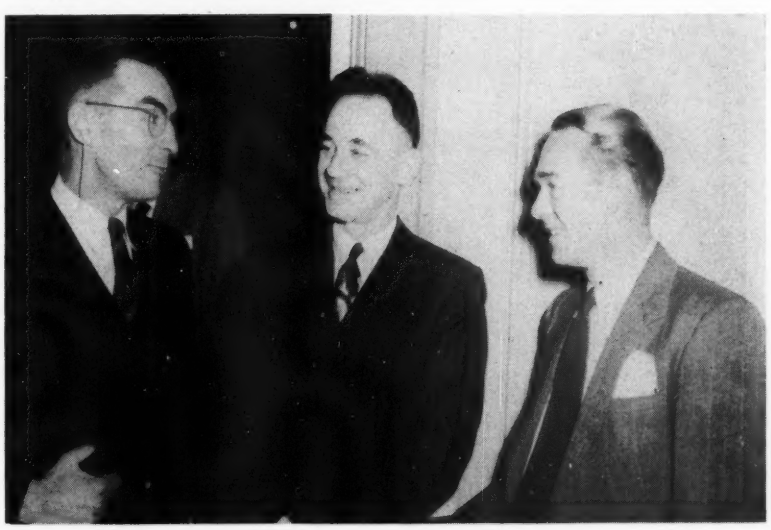
Summarizing excellently the job being done by the nation's entomologists, Dr. E. F. Knipling, retiring president of the A.A.E.E., declared that "the many new chemicals being used to control insects and other pests that threaten the health of man are saving hundreds of thousands of lives and preventing millions of illnesses each year." ◆



Dr. Walter E. Fleming, B. E. P. Q., left, meets with C. A. Clark, General Foods Corporation and Lee C. Truman, Pest Control Services.



Dr. George C. Decker, Illinois Natural History Survey talks with H. G. Johnston of the National Cotton Council during the convention.



G. G. Dustan, Ent. Lab., Vineland, Ont., M. H. Brunson, B. E. P. Q. and Dr. Alfred Wilkes, Biological Cont. Center, Belleville, Can. at meeting.

From Coal

The Story of Pittsburgh Agricultural Chemical Company

By Hamilton C. Carson
Managing Editor

WHERE do you start if you want to tell the story of Pittsburgh Agricultural Chemical Company?

What is the most significant fact about the company's entrance into the farm chemical field in 1948 and its present position?

Is it the development of the powerful insecticide Parathion?

The manufacture of potent weed killers of the 2,4-D type or of such important pest control materials as BHC and DDT?

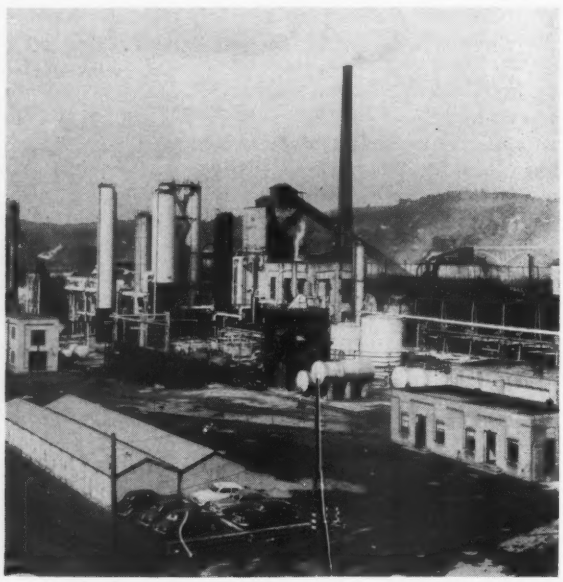
Is it the recent startling announcement of the marketing of the first true systemic insecticide ever approved for use in the United States?

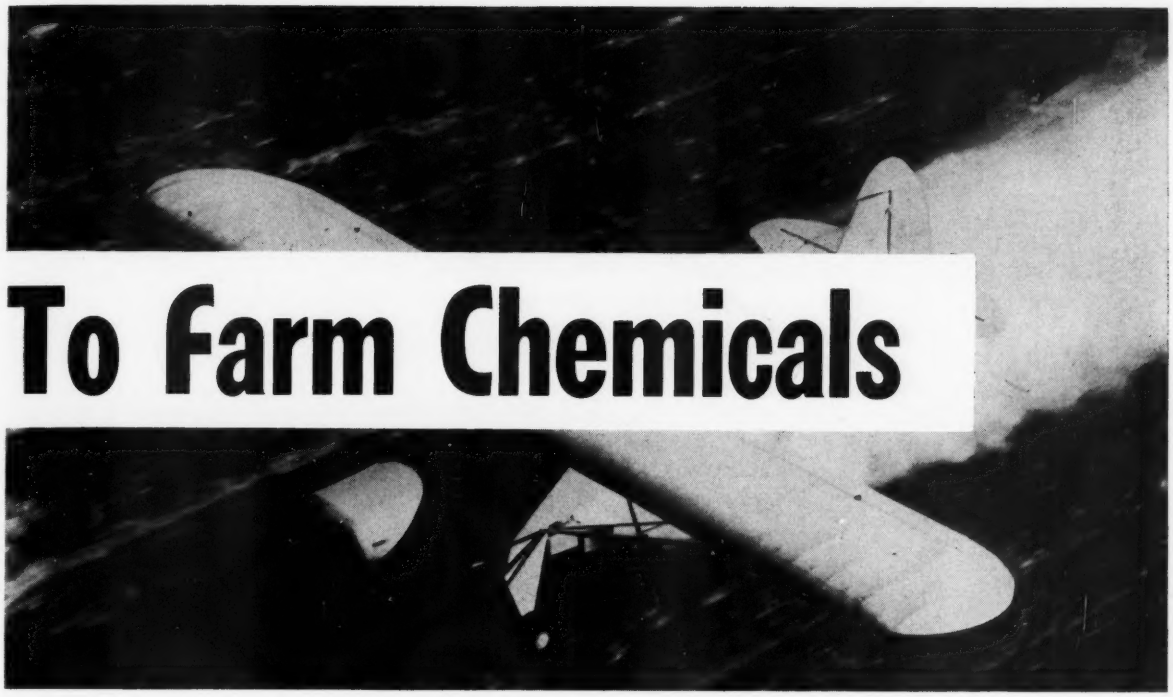
Story Starts in Twenties

Perhaps the story should start in the early days of the Pittsburgh Coke and Chemical Co., the parent

1. After coal arrives at Neville Island by barge (see headline), it is taken to Pittsburgh coke ovens.

2. The various chemicals obtained from the coke ovens move to many plants on the island, like one below.





To Farm Chemicals

organization, which manufactured the important fertilizer material ammonium sulfate back in the thirties.

Or maybe emphasis should be placed on the $20 million expansion nearly completed by PAC.

But, because every product manufactured by Pittsburgh is directly descended from a lump of coal, it might be well to start right there.

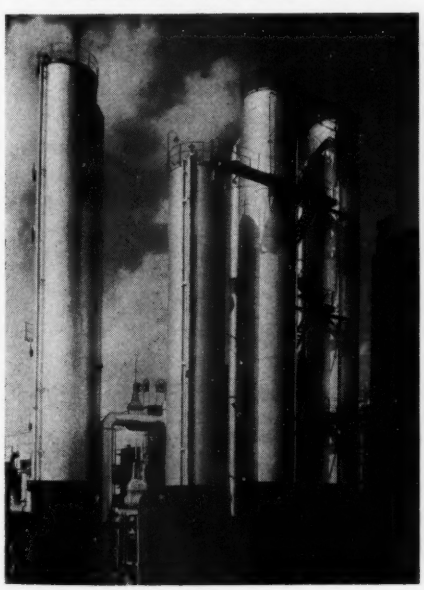
At any rate, by tracing the progression of coal from its arrival at Pittsburgh's world-in-itself on Neville Island, Pittsburgh, Pa., to the various finished chemicals, a good insight into the workings of the organization can be obtained.

For it is coal that is the lifeblood of the company. And it is the versatility of that material as a source of so many products of every day life that enabled Pittsburgh's entrance into the field of farm chemicals in 1948 to be so swift and so wide in scope.

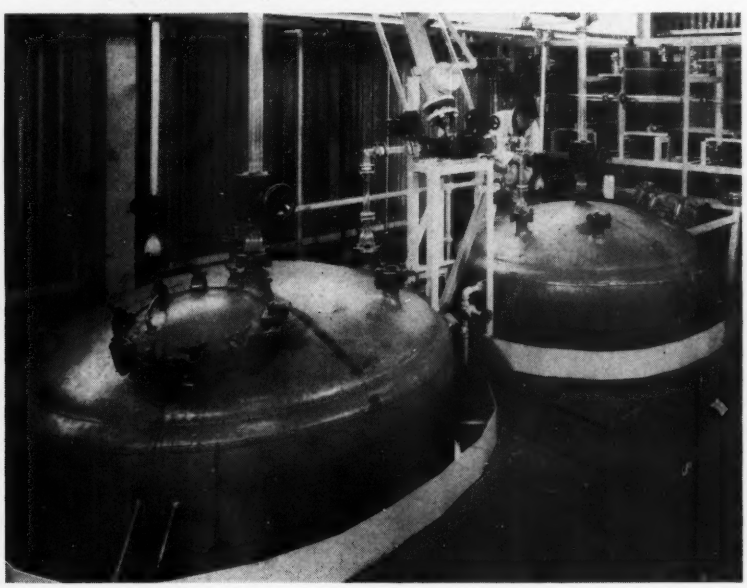
With a Mighty Splash

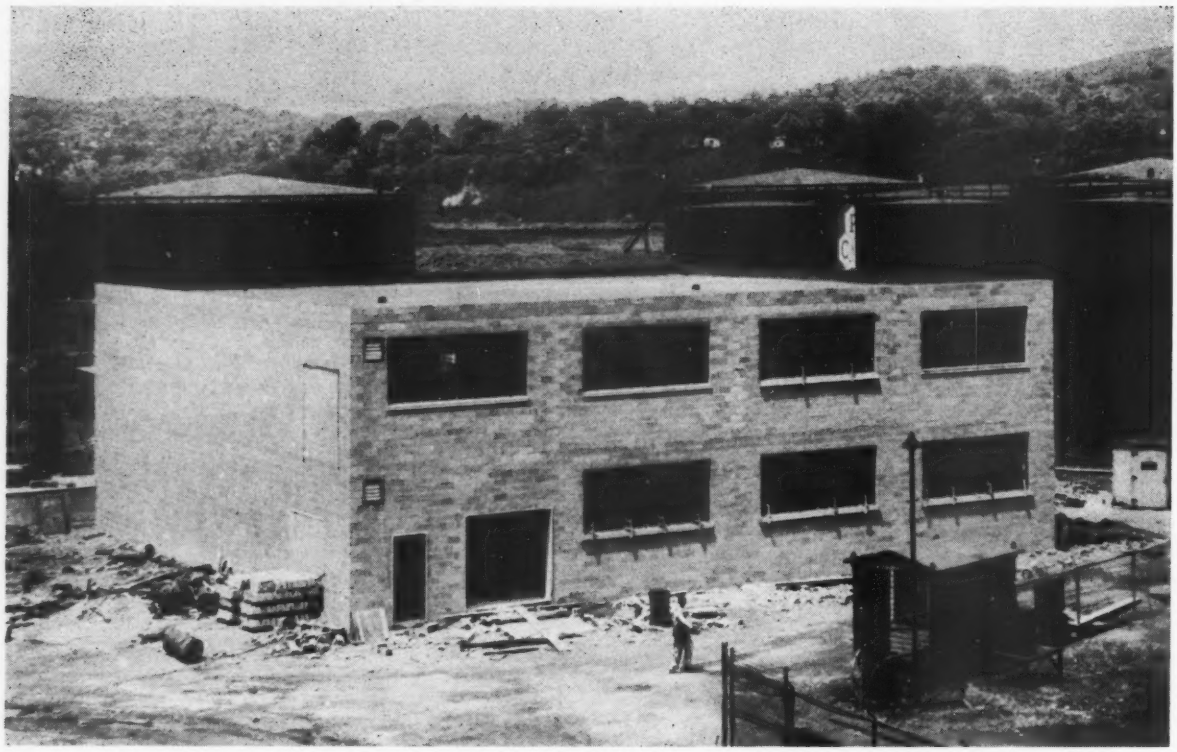
The company didn't just stick its toes into the water to test the temperature—it jumped in with a mighty splash when it started the manufacture of chemicals for agriculture. That jump may best be described by citing the organization's dollar volume of business last year (just four years after entering

3. Part of the coke oven gas goes into benzol. Scrubbers are shown below.



4. From benzol to benzene hexachloride, with the addition of chlorine, completes one phase of the coal to farm chemicals movement.





After looking at the sprawling enterprise that is the Pittsburgh Agricultural Chemical Co., it's hard to believe that the organization was started only four years ago with the small formulation building pictured here.

the industry). The figure is approximately $10,000,000!

But let's get back to coal.

Start of the Process

First step in the highly complex and integrated flow of operations on Neville Island (pictured on this month's cover) is the receipt of coal, mined by affiliates and towed by affiliate river barge.

The coal undergoes preliminary conditioning, after which it is charged in the huge battery of coke ovens maintained by the company. The ovens were complemented by installation of a new group of 35 ovens late last year at a cost of $6 million, bringing the company's total to 140.

(See article on the new ovens in FARM CHEMICALS, November, 1952, page 63.)

Output of the ovens divides first into two classes of materials, solids and vapors, which thereafter take different routes in the process.

The solid product, or coke, is of two types—that intended for the blast furnaces and foundry coke, which requires a stronger structure and larger size.

One Process Is Completed

One part of the process is completed with the movement of coke, iron ore and limestone through the blast furnace, followed by shipment of pig iron and disposal of gas and slag.

"From Coal to Farm Chemicals" becomes a reality in the process with the conversion of ammonia from the coke vapor into ammonium sulfate, a vital fertilizer ingredient.

Among the myriad of materials coming from the light oils is benzene, some of which is used in making farm chemicals such as BHC, DDT and 2,4,5-T.

It is necessary to follow the development of crude tar to locate the position of 2,4-D herbicides in the Pittsburgh cycle of operations.

Phenol and cresylic acid are among the first group of products derived from the tar. Part of the phenol is used in the production of the potent weed killer 2,4-D, while the cresols are the basis for manufacture of several insecticides and herbicides.

Wood preservatives, another phase of the agricultural field, are derived from the creosote produced from the coal tar.

More Complex Than It Sounds

That, basically, is the flow line from coal to the major agricultural products manufactured by the company. The process, of course, isn't quite as simple as outlined—there's a lot of crossing of the material and process lines—but the fundamental route is indicated.

When the Pittsburgh Coke and Chemical Co. made its announcement on Feb. 24, 1948 of its new affiliate—the Pittsburgh Agricultural Chemical Co., the organization made its formal entrance into the field of farm chemicals.

Actually the story starts almost two decades earlier, in 1929, with construction of an ammonium sulfate plant.

Production of that fertilizer material wasn't done by the company under its present name, however, for the story of growth and expansion of the company

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from a blast furnace to a sprawling industrial organization is as dramatic as the metamorphosis of a pile of coal to a package of chemicals.

The blast furnace on Neville Island, nucleus of the organization, was built in 1900 by Carnegie Steel and later operated by American Steel & Wire Co.

Davison Coke & Iron Co., predecessor of the present company, purchased it in 1928. The company was reorganized in 1936 as the Pittsburgh Coke & Iron Co. and the name was changed to the present title in 1944 to emphasize the production of chemicals.

New construction came fast in the thirties, highlighted by a sulfuric acid plant in 1939. World War II brought the expansion plans to a standstill, however, and Pittsburgh concentrated on materials for the war effort.

Ideally suited to move into the farm chemicals field by the nature of the Pittsburgh organization, and with significant war-time achievements behind them (principally making activated carbon for gas mask canisters and many other chemicals for wartime requirements) the logical entrance into the field was made with the 1948 announcement.

First production, aside from ammonium sulfate, was manufacture of the rodenticide ANTU (alpha-napthylthiourea), and the insecticide DNOC (dinitro-ortho-cresol).

Early Construction by Company

In the first two years of PAC, construction was completed on plants for 2,4-D and BHC as well as an agricultural formulation plant (see photo).

Behind the rapid Pittsburgh expansion is a group of officers moving just as fast. Swift development of the company has been possible under the direction of R. M. Marshall, president of Pittsburgh Coke & Chemical Co.

William J. Haude heads the division and Dr. J. B. Skaptason is vice president. The PAC Neville Island manufacturing facilities are under the direction of W. T. McLaughlin.

Managing export sales is David Hoyer, who joined the organization shortly after creation of the division.

Supervising the network of sales offices for Pittsburgh products throughout the United States is H. F. Tomasek, sales manager for PAC. As technical sales director, W. Scott James has the vital job of coordinating research, working with experiment stations in nearly every state testing new products. He then introduces them to the sales market.

Scott Supervises Research

Dr. R. C. Scott supervises the company's research of chemicals for agriculture. He is assisted by a large staff at the newly constructed research laboratory on the island.

Most merchandising of PAC'S products is done through large distributors around the country.

In addition, a sales office is scheduled to be opened in Mexico City for export of the chemicals.

By a special arrangement made in 1949 the organization is licensed to produce certain chemicals developed by Farbenfabriken Bayer of Leverkusen, Germany. To do this the company formed the jointly owned Chemagro Corp. with Geary Chemical Corp. Geary is licensed by Farbenfabriken Bayer with exclusive rights to develop several agricultural products. Under the joint operation of Chemagro, PAC manufactures some chemicals, including the organic phosphate insecticide Metacide, methyl parathion and the new systemic insecticide Systox.

Development of these organic phosphate insecticides was another important stride made by Pittsburgh, through its affiliate, Chemagro Corp.

It started with small-scale production a few years ago and was increased in 1951 with completion of a large plant on the island.

Further Expansion Planned

Expansion doesn't stop there, for more than $3 million of the 1952 budget went for expanded chemical facilities. Included is a new plant for production of 2,4-D and 2,4,5-T herbicides.

Currently under construction also is a new DDT plant costing $1,500,000.

In another direction, the company plans expansion also into the field of veterinary chemicals.

Biggest development for the future, however, probably will come in the field of systemic insecticides, pioneered in this country by Pittsburgh and Chemagro.

With the May announcement of Systox, PAC introduced what may be one of the most interesting insecticides ever presented to the American Farmer.

Systox, as described in FARM CHEMICALS (June, 1952, page 13) is called a "systemic" pesticide because it is absorbed by the roots, leaves and stalks of treated plants.

After absorption of the chemical, treated plants become highly poisonous to insects for much longer periods than gained by surface sprays of insecticides.

The new product may be used as a spray or may be applied in a water solution to the soil. By means of translocation the entire plant becomes highly toxic. Furthermore, new growth on the plant is protected from bugs.

The Future of Systox

Future development of Systox is possible in two important fields: treating seedlings prior to transplanting, and blending with fertilizers for joint application of plant food and plant protection.

Not only does the Agricultural Chemical division develop new products for farmers, it supervises a large-scale testing program to assure their effectiveness before marketing them.

Active research is performed in scores of agricultural experiment stations with Pittsburgh products. Many grants-in-aid have been established to pay for the testing of materials developed by the division.

Research, testing, marketing, expansion . . . these are all facets of Pittsburgh Ag Chem's plan for integrating a program of coal to farm chemicals which will cover completely the full range of the rapidly expanding industry. ◆

Another answer to the sulfur shortage: Far East is making

Serpentine-Fused Phosphate

By Tah-Ho Huang
Taiwan Fertilizer Co., Ltd.
Taipeh, Taiwan (Formosa), China

IN FACE of the current shortage of sulfur in some countries and the depletion of sulfur resources in others the magnesium silicate fusion process for the production of phosphate materials suitable for use as fertilizers deserves the full attention of fertilizer experts.

Processes applying essentially the same principle had been known for a long time (6, 14, 18, 20, 21), but it was not until the publication of an article in 1943 by Walthall and Bridger that definite progress had been made.

Since then, growing interest has been demonstrated in the commercial development of the process in the United States, Japan, China and other countries (such as Sweden and India) as well (5, 6, 7, 10, 11, 14, 15, 16, 17, 19, 20).

The magnesium silicate minerals which have been used in small scale tests and large scale works include olivine (15, 16, 20, 21), deweylite (14), serpentine (6, 7, 10, 11, 14, 19) and talc (7, 10). There is reason to believe that magnesite, dunite (21) and other magnesium-bearing minerals also can render satisfactory service.

Furnaces Used

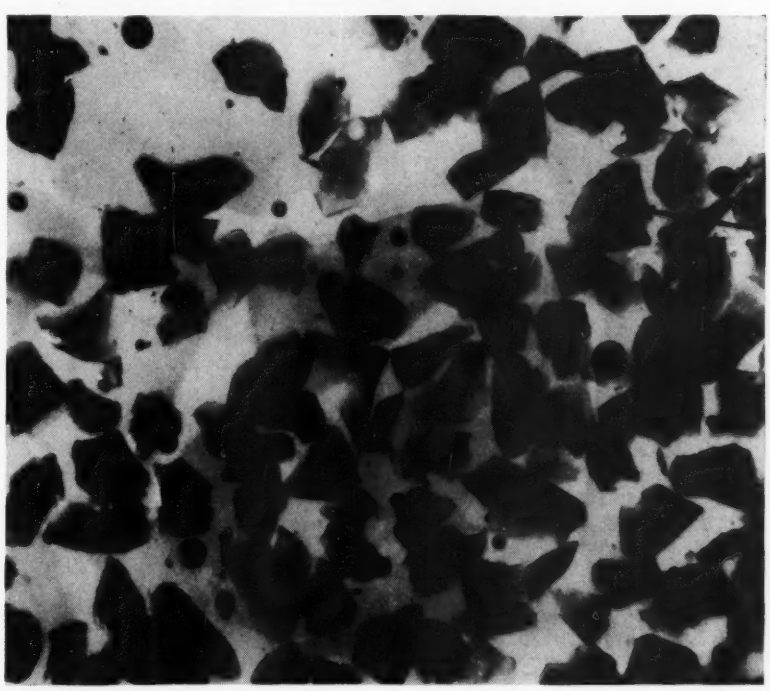
The furnaces with which test operations have been made may be mentioned: Detroit rocking indirect-arc furnace (14, 21), indirect-arc furnace of the Moissan type (7, 10), single electrode arc-resistance furnace (10, 21), three phase modified Greene arc furnace (16) and three phase arc-resistance furnace of the carbide type (11, 15).

Acheson graphite (16), baked carbon and Söderberg electrodes all have been used successfully in plant scale operations (8). Recently it was reported that rotary kiln and shaft and open-hearth furnaces have been tested in Japan, presumably without much success. For rock phosphate fusion serpentine is being used almost exclusively in Japan and China and open arc-resistance furnace of the carbide type has been found to be simplest and most suitable in practice.

Essential Operations

The essential unit operations involved in the manufacture of serpentine-fused phosphate are crushing of rock phosphate and serpentine to 1″–2″ size (or less for furnaces of smaller capacity), mixing the raw materials, fusion in the furnace, quenching the molten material with violent streams of water,

Photomicrograph shows the uniformity of serpentine-fused phosphate glass. Big grains show crystallization. Round objects are air bubbles.



The author expresses his thanks to Dr. Vincent Sauchelli, Davison Chemical Company, for his encouragement during the preparation of this report.

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drying the coarse product and grinding the coarse product to a fine powder, preferably in a tube mill, to —100-mesh or finer (6, 7, 11, 14, 15, 16, 20).

Serpentine is a hydrated magnesium silicate mineral with the formula $3MgO.2SiO_2.2H_2O$. It has been reported that pre-calcination to remove water of crystallization is essential (5, 20) to avoid operation hazards and to effect improved thermal efficiency. However it appears that with open, shallow furnaces of the carbide type, direct use of raw serpentine does not give rise to undesirable reactions except more gassing as previously observed (16); furthermore, results of large scale tests do not show significant improvement in thermal efficiency following pre-calcination of the serpentine used in a coke-fired lime kiln (11).

Raw Materials Important

Correct proportioning of rock phosphate and serpentine depends primarily on the grade of the raw materials available. It has been shown that products of high solubility have approximately the following molecular proportion; $3CaO:P_2O_5:3MgO:3SiO_2$ (7, 10, 14).

In practice, the MgO content of the mixed charge should be kept at approximately 15 per cent or preferably higher and the P_2O_5 content at approximately 20 per cent or slightly lower (7, 10, 11). With 10 parts of the average rock phosphate analyzing 32–34 per cent P_2O_5, seven parts of raw serpentine containing 36 per cent of MgO would be sufficient (11).

Rapid quenching with water is an essential step in the process (5, 6, 7, 14, 15, 16, 20, 21). It is worthwhile to use water jets or sprays operating at 70 to 100 p. s. i. g. (16) or higher so that the molten material can be shattered into small fragments almost instantaneously to facilitate more rapid cooling.

However, sprays at 60 p. s. i. g. or lower pressures also give satisfactory results provided much more than 10 tons of water are available for cooling each ton of dry product (11).

Iron Formation

Iron formation might be considerable, especially when Söderberg electrodes are used (11). It is

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1-3 New Bagpak Catalog

A new catalog, describing its line of multiwall paper bags, has been issued by the Bagpak division of International Paper Co. More than 400 commodities can be packaged in the bags, the illustrated booklet states. It outlines various types of multiwalls and shows how they can fit into your packaging picture. **Code Number 1-3.**

1-4 Magnesium Ramps

Magnesium ramps, for car-loading and truck-loading operations are available in many sizes for industrial use, Penco Engineering Co. reports in a folder. A recent release describes the Penco flared ramp for car loading and the Penco Two-Section Ramp for Truck Loading operations. **Code Number 1-4.**

1-5 Bag Sewers

New data on its Two-Headed Sewing Pedestal for closing paper, cloth or burlap bags after they have been filled are presented in a brochure available from Richardson Scale Co. Four photos and accompanying text describes the loading and sewing operation. **Code Number 1-5.**

1-6 Crushing Equipment

Capacity and power requirements, along with complete technical information, is given in the latest catalog from Stephens-Adamson Co. Crushers designed for every purpose, including sticky materials, are described in the literature. **Code Number 1-6.**

1-7 Monotube Dryer

A new means of obtaining by-products and recovering solvents is outlined in a catalog from Link-Belt Co. Economical drying and cooling are two other functions of the inexpensive Monotube dryer developed by the company. After extensive lab tests, company says the dryer is available for general use. **Code Number 1-7.**

Here is a list of the NEW PRODUCTS and BULLETINS described on this and the Industrial News pages of this issue giving their monthly code number.

- 1-1 Film on Bags
- 1-2 Mixing Tank
- 1-3 New Bagpak Catalog
- 1-4 Magnesium Ramps
- 1-5 Bag Sewers
- 1-6 Crushing Equipment
- 1-7 Monotube Dryer
- 1-8 Conveyor Belts
- 1-9 Handling Equipment
- 1-10 CO Detector
- 1-11 Insecticide Concentrates
- 1-12 Davison Products
- 1-13 Dockboards
- 1-14 Process Equipment
- 1-15 Complex Fertilizers
- 1-16 Process Control
- 1-17 Paint Primer
- 1-18 Metrogram Balance

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1-8 Conveyor Belts

Thirty-five years of experience are behind conveyor belts manufactured by Barber-Greene Co. That's why they pride themselves on their line of conveying belts for every industrial purpose. New catalog shows construction of company's belting material and tells why it is superior to others for your conveying job. **Code Number 1-8.**

1-9 Handling Equipment

Hough Payloaders are made for the specifications of nearly every materials handling job you could mention. And the company is constantly improving its equipment on the basis of industrial experience. Payloaders have had wide experience carrying bulk materials in fertilizer plants and they have many other uses, according to company literature. **Code Number 1-9.**

1-10 CO Detector

If carbon monoxide is a problem in your plant operations, you might consider the many features of Taller & Cooper's automatic detector for the gas. CO, in concentrations of as low as five parts per 10,000 is a deadly poison. If it is present in your plant, consult literature from the company. **Code Number 1-10.**

1-11 Insecticide Concentrates

Independent formulators, note: Pioneer Chemical Associates is a good source of supply for raw materials and concentrates because their price is right, quality standards are assured, they have many shipping points and an excellent consulting service. Literature describes their products. **Code Number 1-11.**

1-12 Davison Products

Compounds with potential uses as insecticides and fungicides are described in a recently issued brochure from Davison Chemical Corp. The literature lists organic silicofluorides and gives technical data on the materials. Four-ounce samples of the compounds are available immediately; it takes 30 to 90 days for development quantities. **Code Number 1-12.**

1-13 Dockboards

How Magnesium Company of America's light-weight heavy-duty Dockboards speed loading and increase safety is described and illustrated in a new company folder. It contains 10 photos of magnesium bridgeplates in use at i dustrial docks, and illustrates applic tion for many shipping situations. Cod **Number 1-13.**

1-14 Process Equipment

Dry blending equipment is feature in a new booklet from Patterson-Kelle Co., Inc. covering the company's line process equipment. Special emphasis placed on the twin-shell blender whic the company says has caused man processing firms to revamp their blend ing methods. **Code Number 1-14.**

1-15 Complex Fertilizers

A valuable paper is available to ferti lizer manufacturers interested in nitro phosphate processes. It is being offere by General Industrial Developme Corp. Prepared by the company of S Gobian, France, the paper describe ways of making granulated N_2-P_2O_5-K_2 products and gives details and adva tages of the method. It is entitle "Complex Fertilizers." **Code Numbe 1-15.**

1-16 Process Control

For manufacturers interested in scien tific methods of process control, a ne catalog from Fischer & Porter Co. give details on various systems for measur ment and control of flow, pressur liquid level and other factors. The illus trated booklet outlines pneumatic, mag netic, electric and other systems. **Cod Number 1-16.**

1-17 Paint Primer

If rust is a problem in your plant, yo may be interested in a paint prime which covers and adheres to rust, acti on it slowly to bond steel, rust an primer together chemically. Carbolin Co. has information on the product which was developed primarily to sto the peeling of polyvinyl chloride finishe from rusty steel. **Code Number 1-17**

1-18 Metrogram Balance

All kinds of weighing jobs can be don by the Metrogram Balance, accordin to a bulletin available from Arthur S La Pine and Co. Testing, weighing packaging and compounding are som of the jobs it will do. Capacity to 11 pounds with sensitivities from plus o minus 10 milligrams. **Code Numbe 1-18.**

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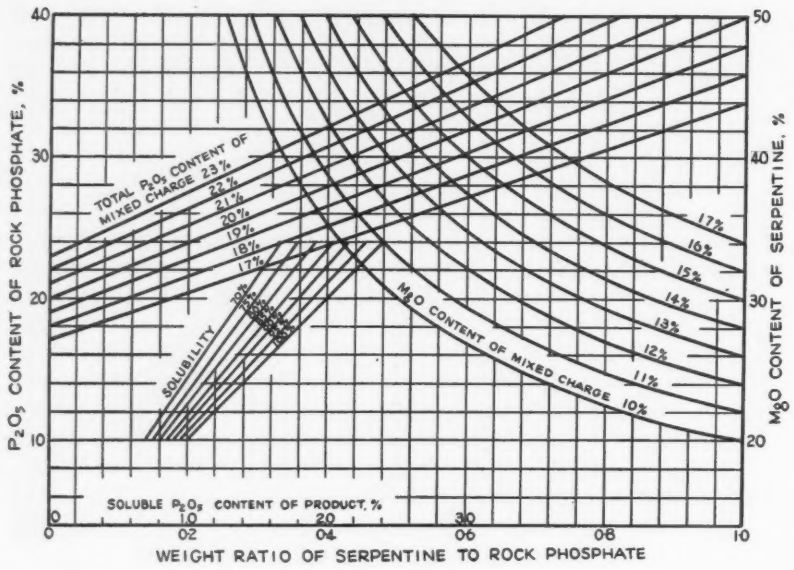
FIG. 1. Composition diagram of serpentine-fused phosphate



a good practice to remove the metal at a lower tap hole to avoid possible hazards (16, 20). But experience with open furnaces of the carbide type shows that when small amounts of metal are allowed to drop onto the quenching trough, no reactions of explosive violence might take place (11). A thin layer of metal above the carbon lining of the furnace might serve as a preventive coating against oxidation.

The granular product may be drained to less than 3 per cent of moisture. It can be dried very rapidly at low temperatures to below 1 per cent. Small metallic globules may be removed before pulverization by feeding through a magnetic separator.

So much about the essential features of the serpentine fusion process. With a knowledge of how serpentine-fused phosphate is manufactured, one might understand better the following discussion of some of its physical, chemical and agronomic properties.

Physical Properties

Color — Commercial products marketed in the United States, Japan and China vary in color from black through dark grey and pale grey to light green. It is believed that the divergence in color originates partly from the impurities present in the raw materials used. Thus, Kasugai and associates show that with the same Japanese serpentine used in fusion, Idaho, Angaur and Florida rock phosphates give respectively black, green and dark brown products (14). With Florida rock phosphate, different box-carloads of Taiwan serpentine may give either a brownish or bluish black product or a dirty green material (11).

Proportioning of raw materials is another important factor. Previous small scale tests with Christmas and Laokai (formerly of Indo-China) rock phosphates and Taiwan serpentine in an arc furnace gave fused materials which changed in color from dirty green through light green to greenish grey (10, 11), depending upon the proportion of serpentine used.

The furnace type evidently also has some influence. With an arc-resistance furnace that is being charged continually a reducing atmosphere prevails inside the furnace crucible, so that some metallic oxides are reduced. The extent to which reduction proceeds determines the coloring property of the impurities on the glass. Color of the product and its availability, however, obviously are two independent properties.

Appearance—Freshly prepared materials assume the appearance of coarse sand. Some bear a metallic luster; some do not. Some have a glass-like transparency; others appear like furnace clinker (usually a result of insufficient cooling).

The following screen analysis of a representative sample (dried) as received in the quenching pit is typical of normal operations (Table 1).

Table 1. Screen Analysis of Unground Serpentine-Fused Phosphate (11)
U. S. Sieve Series

+12-mesh—	2.0%
—12, +20-mesh—	27.9%
—20, +40-mesh—	43.2%
—40, +60-mesh—	16.8%
—60-mesh—	10.1%

The former Manganese Products, Inc. of Seattle once marketed a —150-mesh olivine-fused phosphate (6) while the Permanente Metals Corp. of California has been offering two brands of serpentine-fused phosphate, a —6-mesh "Thermo-Phos Granular" for direct application and a —100-mesh product for use in mixed fertilizers (6, 17).

In Japan, to comply with Fertilizer Laws, marketed serpentine-fused phosphate must be ground to a fineness such that 70 per cent will pass through 100-mesh and 90 per cent through 70-mesh (presumably Tyler Standard). In Taiwan, China, serpentine-fused phosphate is being ground to 100-mesh fineness, Tyler Standard. It must be remarked here that the superiority of a —150-mesh product over a —100-mesh or —70-mesh material under the average farming conditions as yet has not been definitely established.

Hardness—Properly quenched products are rather brittle. Large granules measuring 1/5" can be broken by pressing between the fingers. Slowly cooled materials have a limestone appearance and are comparatively hard. With a well-equipped ball mill or tube mill, there should be no difficulty in reducing the granules to —100-mesh fineness. Metallic granules present in the coarse material might interfere with the grinding operation and should be removed.

Apparent Density—True density determinations by the water displacement method give an average value of 3.3 gm./c.c. (11). Lower figures of 2.98 and 3 have been given by other competent workers (14).

The apparent density varies as the particle size. The following results determined by shaking the

container until no change in volume takes place are typical (Table 2).

Table 2. Apparent Density vs. Particle Size of Serpentine-Fused Phosphate (11)

U. S. Sieve Series, No.	Apparent density, gm./c.c.
+8	1.58
−8, +16	1.70
−16, +30	1.78
−30, +50	1.71
−50, +100	1.62

Three other samples all through No. 8, No. 30 and No. 100, U. S. Sieve Series, have respectively the following apparent densities, 1.72, 1.83 and 1.70 (11). Somewhat lower figures have been reported by other workers (14), probably because of the difference in iron contamination.

Glass Content—The amorphous nature of this type of material first was mentioned in a German Patent granted in 1939 to Schleede and associates (18). It has been emphasized repeatedly that proper quenching is an important step in the successful operation of the process (5, 6, 7, 11, 15, 16, 20, 21). Proper quenching prevents the formation of crystals, so that the best product is one which is 100 per cent glass. Insufficient cooling or subsequent heat treatment facilitates crystallization and hence lowers its chemical solubility and fertilizer efficiency as well.

Chemical Durability—Chemical durability is one of the characteristic properties of glass. Serpentine-fused phosphate is a glass, hence it must be capable of resisting the corrosive action of atmospheric agencies (primarily water and carbon dioxide). Tests show that after 178 days exposure even under the most humid conditions (96 per cent relative humidity), coarse, medium and fine serpentine-fused phosphate samples do not show any tendency to cake, do not change in weight and all remain dry and drillable (9). Hence, serpentine-fused phosphate can be stored in bulk indefinitely. It appears that serpentine-fused phosphate is one of the few chemical fertilizers known to exhibit such characteristic properties.

Magnetic Property — Serpentine-fused phosphates of different origin do not possess the same magnetic property. Tests with a horseshoe magnet show that the serpentine-fused phosphates marketed in the United States and in Japan contain only traces of para-magnetic material, but some home-made product exhibits entirely different properties. The following results are typical (Table 3).

The presence of large amounts of para-magnetic matter in the samples may be caused by one or more of the following reasons: a) melting of the Söderberg electrode casing, b) reduction of metallic oxides, c) formation of magnetite under the influence of the strong magnetic field. The percentage increase in para-magnetic matter shown may be caused by the fact that fine grinding has set free the para-magnetic ingredients which have been imbedded in or adhered to the glass (11).

Reactions to Heat Treatment—Hill and associates show that all of the iron-bearing materials assume a dirty brown color when they are heated in air for some time below the temperatures of complete fusion (6). Some samples become reddish brown when heated at much lower temperatures such as 850°C. (11). In fact, the rapid change in color is true only with fine samples.

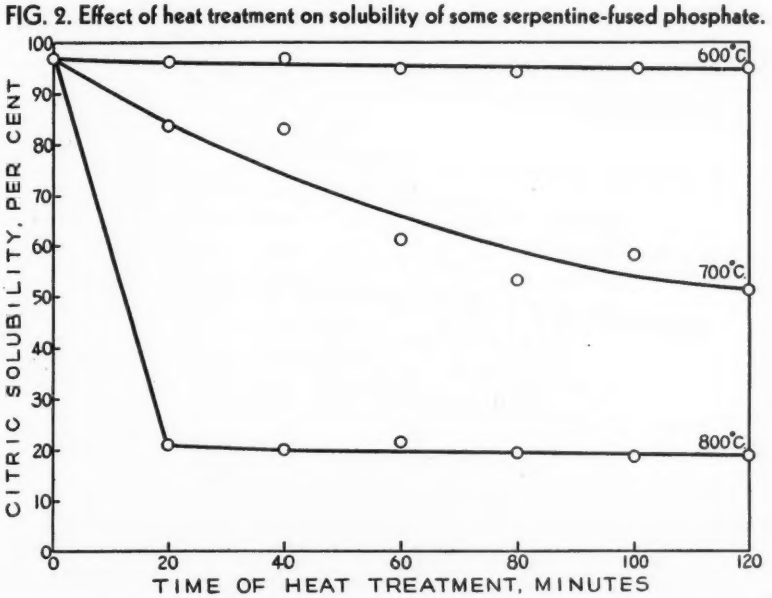
When heated at 700° or 800° C., coarse dirty green samples first gain in brilliancy and become brownish black; after two hours heating or longer, a majority of the granules appear like yellow sand while the fine fractions assume a reddish brown color. Some dark grey materials of different origin become pale grey only after similar treatments (8).

The characteristic change in color always is accompanied by the appearance of crystals—primarily apatite and pyroxene minerals—and consequently a decrease in P_2O_5 solubility (8). The ease of crystallization in the temperature range 1000° to 1300° C. is different with different materials (6). Some report that crystallization takes place at 850°C. or lower temperatures (8, 14). With some samples, crystallization and reversion (decrease in citric solubility) occur after 6 hours heating at 600°C. or 20 minutes heating at 800°C.; at 700°C., gradual changes take place (8).

It appears that serpentine-fused phosphate may be different from olivine-fused phosphate in its reaction towards heat treatment. Some olivine-fused phosphate might not crystallize after 48 hours heating at 1200°C. (6). The divergence has not yet been explained.

Fusion Point—The fusion temperatures of U. S. products lie between 1300° and 1400° C., for instance, some melt at 1320°, 1335°, 1370° and 1400°C. (6). Fused phosphate made from Florida pebble phosphate and Taiwan serpentine has a good fluidity at 1400°C. (11) and 1350° C. or lower with

FIG. 2. Effect of heat treatment on solubility of some serpentine-fused phosphate.



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other carloads of serpentine (8). Hence the fusion temperature might be as low as 1300°C. or even lower. Laboratory tests show that partial sintering might occur with some samples at 880° C. showing the presence of a low melting component in the material. When this happens, the porcelain crucible in contact with the material is attacked.

Chemical Properties

Chemical Composition—The chemical composition of commercial products marketed in the United States, Japan and China is shown in Table 4.

Although it is possible to produce small lots of serpentine-fused phosphate with a citric solubility of 97 per cent or higher (6, 11, 14), yet for various practical reasons, such as contamination of impurities in some carloads of serpentine, incorrect proportioning as a result of mechanical troubles and occasional insufficient cooling, the average citric solubility of most commercial products hardly exceeds 96 per cent. It is neither economical nor practical to guarantee a citric solubility much higher than this level.

It should be noted that the commercial products contain 15 to 20 per cent of MgO, most of which exist in citric acid soluble form. Hence, serpentine-fused phosphate is no doubt a valuable source of both phosphoric acid and magnesia. The presence of magnesia bestows on such product a desirable soil sweetening property, which, as has been estimated by Moulton for olivine-fused phosphate, is equivalent to 1200 lbs. of limestone per short ton (16, 20).

As serpentine-fused phosphate is somewhat different in composition from olivine-fused phosphate, furthermore, serpentine-fused phosphates of various origin do not have the same MgO content (6, 7, 14, 17, 19), it is evident that the physiological acidity of serpentine-fused phosphate is bound to vary. Apparently the physiological acidity would be higher than 60B for those products with a higher MgO content.

Trace Elements—The elements which have been reported to be present in some serpentine samples, besides Mg, Ca, Fe, Si and Al, are

Table 3. Composition of Para-magnetic Constituents in Serpentine-Fused Phosphate (11)

Sample[a]	Para-magnetic material, % of total	Composition of para-magnetic material		
		Total P_2O_5, %	Citric soly. of P_2O_5, %	Total iron as Fe_2O_3, %
Coarse(—8-mesh[b])	2.1	27.5	25.5	75.90
Medium(—30-mesh[b])	7.7	21.1	58.5	48.17
Fine(—100-mesh[b])	20.5	17.83	87.4	20.70

[a] Para-magnetic fraction not removed before grinding
[b] U. S. Sieve Series

Table 4. Composition of Serpentine-Fused Phosphates Marketed in Various Countries

	(Per cent) United States a	United States b	China c	Japan d
P_2O_5	20.04	20.3	20.4	20.0
Citric solubility	99.0	91.0	96.0	92.5
CaO	32.4	31.3	32.1	30.0
MgO	17.1	15.3	18.6	20.0
Al_2O_3	1.8	3.0	2.3	>5.0
Fe_2O_3	——	3.2	2.5	>5.0
FeO	3.5	——	——	——
SiO_2	23.2	24.7	23.7	26.0
F	1.70	1.5	2.0e	——

a Sample No. 2497-a (6).
b Guaranteed composition (17).
c Marketed by the Taiwan Fertilizer Co., Ltd.; before conditioning to make an 18 per cent product.
d Average (19).
e Approximate value.

Table 5. Citric Solubility vs. Particle Size of a Serpentine-Fused Phosphate Sample

U. S. Sieve Series	Total P_2O_5, %	2% citric acid sol. P_2O_5, %	Citric solubility, %
+4	20.90	9.92	47.5
−4, +8	21.21	12.57	59.8
−8, +16	21.14	17.31	81.9
−16, +30	21.24	18.95	89.2
−30, +50	21.94	19.28	87.9
−50, +100	21.73	18.93	87.1
−100	21.24	18.59	87.5

Cr, Mn, Ni, Ba, Ti, Na, K, S etc. (3). Among the six more important trace elements, only B, Cu and Zn are lacking. Thus, serpentine, after solubilizing, may be considered as a nice source of trace elements. This statement holds true for serpentine-fused phosphate as well.

Some olivine-fused phosphate has been reported to contain, besides those trace elements above mentioned, also B, Cu, Zn, V and Sr (16). Olivine and serpentine are mineralogically very closely related. The impurities present in one may as well be found in the other. It follows, therefore, that some serpentine-fused phosphate sample may contain all the trace elements as required for normal plant growth.

Chemical Availability — Several solvents have been used for measuring the solubility of this type of fused phosphate, viz. the citrated ammonium nitrate, the neutral ammonium citrate and two per cent citric acid (6, 7, 11, 15, 16, 17, 18, 21).

These are no more than arbitrarily chosen solvents used in connection with certain definitely prescribed procedures for measuring solubility of the material, which, itself a so-called "chemical availability," is considered as an index of the plant food value of the material under average field conditions.

As a result of extensive laboratory investigations (4, 13), the Wagner's two per cent citric acid test (1) which was prescribed for basic slag and had been used in the United States for serpentine-fused phosphate (6, 17), was removed from the Official Methods of Analysis (2) after a resolution made in 1949 (12). Partly because of its simplicity, however, the Wagner's test (1) still is being used by fertilizer control officials in Japan and China as an official method for serpentine-fused phosphate. It has not been definitely established that this test cannot serve as a reliable measure of the relative plant food value of serpentine-fused phosphate.

Reversion as a Result of Heat Treatment—As above indicated, slow cooling of the melt or subsequent heat treatment of high grade products (amorphous) facilitates crystal formation, which is accompanied by simultaneous reversion in chemical solubility. The curves shown in Fig. 2 are typical of some serpentine-fused phosphate samples made by fusing Florida rock phosphate with Taiwan serpentine (11).

It can be seen from Fig. 2 and above discussions that when the time of heating does not exceed two hours, the reversion is gradual at 700°C., but very rapid at 800°C., dropping in the latter case from some 96 per cent soluble to some 20 per cent after 20 minutes (8).

Chemical Availability vs. Glass Content—As above indicated, all-glass materials have a high chemical availability, which may be expressed in terms of citric acid solubility, but crystallized samples do not.

Studies with 165 samples of high grade and artificially reverted serpentine-fused phosphates have shown that the citric solubility is a function of the glass content and that the average relationship between these two variables may be expressed by a linear equation $Y = a + bX$, where a and b are constants. The coefficient of correlation is +0.895 which is highly significant for 165 pairs of determinations (8).

The glass content of each sample can be estimated under the polarizing microscope within 5 to 10 minutes. Such results of the correlation studies suggest a quick method which might be used for screening under-grade products.

Fig. 3 is a photomicrograph showing the uniformity of a serpentine-fused phosphate glass.

Chemical Availability vs. Particle Size—That the chemical availability of serpentine-fused phosphate increases as its fineness has been well established (6). It has been further demonstrated that the citrate solubility is more sensitive to fineness while the citric solubility reaches a maximum in the neighborhood of —100-mesh (4, 6). For practical purposes, serpentine-fused phosphates are usually ground to —100-mesh before making solubility tests.

Previous observations show that improperly quenched materials contain large quantities of coarse granules and are usually less soluble. Subsequent tests on the solubility of the mechanically separated portions which have all been ground to —100-mesh show that the coarser the granules, the lower is the solubility (Table 5).

In plant operations, it appears worthwhile to remove those fractions retained on an 8-mesh screen.

Agronomic Properties

As already mentioned, serpentine-fused phosphate is a nice source of phosphorus, secondary essential elements Ca and Mg and trace elements. It has been marketed only as a phosphorus carrier, however, so no premium has been given to the other valuable constituents it contains. It is physiologically basic. Thus, theoretically, it should be as effective in acid soils as superphosphate is in neutral soils. Results of well-designed experiments conducted in the T. V. A. and at Beltsville, Md. actually demonstrate that such phosphate is, on the average, more effective than superphosphate in acid soils, but not in alkaline or neutral soils (6, 13, 21).

Such fused phosphate has been manufactured and marketed in the Pacific Coast area of the United States. It has been known that green house and field experiments have been made in that area, yet little information with regard to its fertilizer efficiency has been published (13). Apparently, the prevalence of alkaline soils in that area has a decisive effect on the efficiency of the material under actual field conditions.

In Japan, extensive field fertilizer experiments with serpentine-fused phosphate have been made and apparently some of the results have been used by the promoters in their sales campaign. The following crops have been reported to respond much better to serpentine-fused phosphate than to superphosphate: wheat, sweet potato, Irish potato, soya bean, rice and millet (19), presumably under certain experimental conditions.

Other tests show that under the field conditions of Japan, based on the results of experiments with wheat, barley, spinach and potatoes, the value of serpentine-fused phosphate is as high as that of superphosphate.* This appears to

(*Continued on page 71*)

*Nakagawa, M., Chem. Abst., 44, 6561, (1950).

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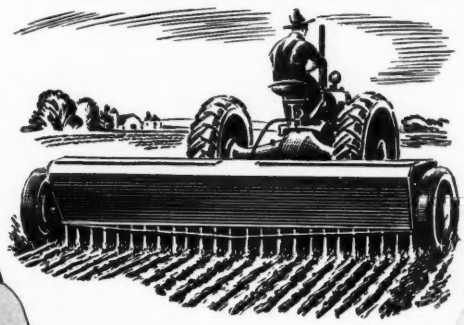

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A top salesman of farm chemicals gives some important pointers on

How To Do Good Selling

By Joe E. Culpepper
Spencer Chemical Company

ANY idea that anyone is good enough to sell anything to anybody simply is not true. It never has been and it never will be. "Good Selling" is predicated on certain fundamental principles which must be observed and practiced. To achieve "Good Selling" the right tools are required. What are these tools? I would say they are:

1. A meritorious product.
2. Dependable service.
3. Team work.
4. The right kind of salesman.

Without this minimum kit of tools, there is little hope.

In the first place, a salesman to do "Good Selling," must offer a meritorious product or service—one that meets a need or desire of his prospects. The slickest-tongued salesman on earth who offers an unsound, uneconomic or unwanted product is having no part in "Good Selling." He may know salesmanship—Yes! "Good Selling?"—No!

Service Necessary

Regardless of how good a salesman individually may be, or how worthwhile his product, he cannot continue to do "Good Selling" unless he works for a company which backs him up with dependable and constructive service. Life is too short, our self-respect too precious and our nervous system too delicate to work for an organization that leads us out on a limb, parks us there for a few weeks or months, then saws off the limb and says, "Look for another limb."

By Joe E. Culpepper

A salesman deserves home office planning and administration which gives him a solid rock of good working conditions and dependable service upon which he can stand with confidence and assurance. Personally, I feel very strongly on that point.

But "Good Selling" involves much more than a worthwhile product and dependable service. To do a good job of "Good Selling," we must have the right people working together as a selling team. In this day and age of a complicated economic and commercial community, there is little place, I fear, for the man who insists on being the star of the game, always proclaiming how good he is. One who tells how worthless and unnecessary are the company's activities in such things as advertising, technical service, market research and agronomy.

He talks about the "cluck-heads" in the traffic department, the overstaffed home office and summarizes his views by implying, "If my management were smart, they'd fire most or all of those worthless guys, give me a big raise in salary, be more liberal with my expense account and then I'd really show them how to sell goods!"

One-Man Show

That man wants to call the signals, carry the ball and receive all the acclaim. He refuses to admit the other members of his team serve any good purpose. I don't think there are many places available today for such "Super Salesmen" and I can tell you for certain there is no place in our Spencer sales organization.

We are looking for good teammates, rather than prima donnas.

By far the most important tool in any sales kit, in my opinion, is the right kind of salesman. The minimum qualifications of a person to be trained as a salesman are:

1. A good character.
2. The willingness to work.
3. Some native ability to get along with people.
4. Enough perspicacity or "gumption" to keep his foot out of his mouth.
5. Enthusiasm.

These are minimum require-

Presented at the Annual Sales Meeting of Spencer Chemical Company, Excelsior Springs, Mo., Oct. 6, 1952.

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ments. They may appear a little facetious and superficial but I believe they will stand up pretty well under close examination. The first and most basic requirement of any Spencer salesman, insofar as I am concerned, is that he or she be a person of good character. The reason for this requirement is not entirely on moral grounds, but also from a cold-blooded business point of view. Any observing individual knows that a person without good character and good habits sooner or later "rots out" and becomes a liability to himself and the company for which he works. So we must put this question of good character at the head of the list.

Now a general sales manager may be able to get along without being willing to work, but not a salesman. It is axiomatic he can't "bring home the bacon" if he lacks the industry to see the prospects. Next to good character, I consider being willing to work the most essential requirement of a sales trainee.

Maybe I am wrong on the next point, but my observation leads me to believe some folks are naturally endowed, to some extent at least, with abilities to get along with people. Some are born with a lot of this, while others have less. It's absolutely imperative, of course, that a salesman have this ability.

Good Disposition Needed

Most of us know we can't do very well if our disposition is such that we jerk a prospect up by the nape of the neck and push him around, but many people apparently do not have the instinct to get along with others on the little and subtle things of life. And this, too, is necessary.

Another qualification of persons who are to do successful selling is one which I rather think nature either provides, or fails to provide, in varying degrees. That is the ability to keep our feet out of our mouths.

All of us have seen the otherwise successful salesman who could hardly open his mouth without putting his foot squarely into it. Though absolutely conscientious and sincere, he lacks the discretion of knowing what to tell and what not to tell. He stays in hot water with the home office and with his customers—and that's bad!

The last qualification I mentioned was enthusiasm. This quality, or lack of it, has far greater effect on a person's accomplishments, in my judgment, than most of us realize. A few years ago the president of the New York Central Railroad, F. E. Williamson, had something to say on this that impressed me greatly. Here it is, in part:

"The longer I live, the more certain I am that enthusiasm is the little recognized secret. The difference in actual skill and ability and intelligence between those who succeed and those who fail usually is neither wide nor striking. But if two men are nearly equally matched the man who is enthusiastic will find the scales tipped in his favor. And a man of second-rate ability with enthusiasm often will outstrip one of first-rate ability without enthusiasm."

My observations lead me to believe Williamson was entirely correct in his views on this matter.

Some Suggestions

Assuming we have a sales trainee with all the qualifications I have outlined, what suggestions, advice, or instructions can we offer to him?

First of all, he must come to realize there are as many skills in selling as in any other profession and as great a difference between the amateur and the professional. To me, "Good Selling" results largely from the right attitude on the part of the salesman.

Most persons are easy to visit, they are dying to buy things, they try hard to help a salesman and they will lean over backwards to cooperate. A salesman who knows his product and what it will do for his prospect, who is genuinely sincere and can convince people of his sincerity and who is enthusiastic about his work, his product and the company he works for has about all the strength he needs for any battle. If he learns and observes a few elementary rules of strategy or sales techniques, he can't keep most persons from buying from him.

A salesman's first problem, obviously, is to get some of the prospect's time and a little of his attention. My theory is there are two ways this can be accomplished. First, by a salesman being smart enough to take the time required for a thorough understanding of his product and what it will do for his prospect, thus being able to contribute something to the thinking of the person he visits. Or, in the second place, if a salesman is lazy mentally and physically, he can purchase a little of his prospect's time by investing some of his company's funds in liquor, wild parties and other entertainment of like nature. The first system is much sounder, more enduring and leads to "Good Selling" results. However, lazy, indolent salesmen often can get enough business to survive for a time by using the second method.

Time Survey

Once a salesman has his prospect's attention there are several things he should remember and respect. In the first place, all of us must realize selling is much more than visiting. The moments a salesman spends face to face with his prospect are few and precious.

A recent field survey by Standard Oil Company showed their salesmen spent, on an average, only two hours and 25 minutes a day with their customers. And of this two hours and 25 minutes, the salesman spent only 33 minutes a day actually talking about the products he was selling. This suggests the most efficient use of time.

Don't imagine for a moment that I am urging you to "fast-talk" your way to a sale. Smooth talk never is a substitute for straight thinking! A salesman is before the prospect to do a job—he should not forget what that job is. He should keep foremost in his mind at all times the "be-attitudes of selling:" Be Natural, Be Modest, Be Truthful, Be Tactful, Be Thoughtful, Be Thorough, Be Specific and then, By Golly, Be Gone. Unplanned and too long visits are the curse and downfall of many salesmen. Let's learn to respect the other man's time and not waste our own.

Even more important, many times more important, than selling a prospect the first time is to hold him as a customer year after year. Unless a salesman can do this, it

(*Continued on page 72*)

Is your fertilizer plant safe? Here's a summary of unfavorable conditions and their remedies.

Fire Prevention Through Design

By George G. Blair
Ebasco Services, Inc.

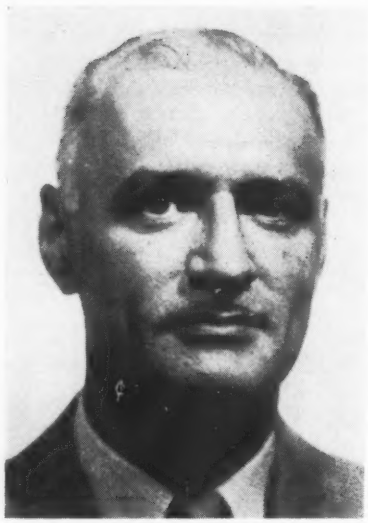
A CHECK of the physical condition of the average fertilizer plant indicates either that the industry's founders had little faith in the permanent roles of nitrogen, potash, phosphorus and calcium in plant nutrition, or that they were overly impressed by those who think soil-building is preferable to plant feeding.

The role of soil nutrients in plant physiology, however, is well established and the fertilizer industry will expand along with the population. This assured future should warrant design and construction of new plants and improvement of old plants to serve for maximum periods at maximum efficiency.

As conditions stand today, some of the new dry-mix fertilizer plants, some of the wet-mix types with acidulation process and perhaps most of the new acid and basic chemical plants are of fire-resistive or incombustible construction with a good proportion of the equipment in the open. Under these conditions fire prevention and protection is simple.

The average dry-mix and older dry-mix properties with acid plants present no such favorable picture as evidenced from past inspection experience, however, and a recent examination of reports and plans covering a major portion of the country.

From a talk given at Fertilizer Section Safety Meeting in Chicago, Oct. 22 and 23.



G. G. Blair

In general buildings are principally frame, frequently of large area and of balloon-type construction. The average plant, judged by construction and building arrangement, is subject to from three-quarters to total destruction by fire.

Protection Lacking

For obvious reasons plants generally are in outlying or rural areas. Consequently public protection is only fair to poor at the properties, probably averaging at best a weak seventh class by National Board grading, where under tenth class is devoid of protection. These conditions prevail despite the fact that many plants are in or adjacent to cities graded third class.

Private outside protection is largely non-existent or of little value. First aid fire protection which could easily be provided generally is inadequate.

Except for some notable exceptions, where central station watchman service is provided, there is usually no watchman service worthy of mention.

There is indication that the over-all electrical situation may be fairly good but there is appreciable use of open-type electrical devices and wiring.

Heating, which frequently is provided only in offices and locker rooms, is furnished by a variety of devices, such as oil and coal stoves, portable oil-forced air, steam, hot water and electric.

Care and cleanliness generally is poor.

Such departures from recommended standards create problems vitally affecting company finances and operation because major factors in both cost and operation are insurance and safety. The unsafe plant will justifiably cause high, perhaps prohibitive, insurance rates. The plant may be rejected as an insurable risk, or be such a poor risk as to preclude an insurance company's underwriting but a very small portion of the total value. Complete coverage would be impossible, or accomplished, only with difficulty in seeking insurance markets. In addition, substandard properties are less efficient in operation and maintenance, and because of the unfavorable impact of poor and unsafe surroundings poorer personal attitudes further lower over-all plant efficiency.

It is evident, therefore, that construction, arrangement and protection deficiencies indicate the remedial measures necessary through proper planning and design of

structures, equipment and protection.

Fire safe construction requires that valuable areas with combustible occupancies be of fire-resistive construction such as reinforced concrete or protected steel, with masonry walls, floors and roofs. For important occupancies which are not combustible, construction should be of a type that will not burn such as all steel, corrugated asbestos cement board on steel frame, and equivalent types. Where wood construction must be used, heavy plank or timber or plank on steel should be chosen, with floor and roof framing planned to permit economical installation of automatic sprinklers.

"Fire-resistive" is defined as construction which will not contribute combustible material to the fire, and in addition will withstand any expected fire without suffering any basic damage of structure. Bare steel does not qualify hereunder. "Incombustible" (or non-combustible) materials, such as all-metal or corrugated asbestos cement board on steel frame and similar variations, are satisfactory for contents which will not burn or which contain only a minimum portion of combustible material.

Safe Construction

The use of various wall boards, sound-deadening or insulating material of cellulose composition should also be recognized as adding combustible material and destroying the incombustible classification.

Processes or process and storage areas should be subdivided as much as possible, to keep building areas as small as practical in order to limit the amount of damage possible by a single fire. This should be done preferably by having separate buildings well spaced from each other with clear space requirements varying, depending upon the type of facing walls, the size of the building, the nature of the occupancy and type of protection available.

In the absence of specific details or standard requirements it probably would be advisable to suggest a 50-foot separation between all major components or hazardous occupancies.

Where space limitations prevail effective isolation or sub-division may be secured by judicious use of fire walls with automatic fire doors and shutters at necessary openings including conveyors. Such walls, without openings or with approved wire glass windows, may shield against external exposure if construction is close to the property line where others have built or may build.

Interior bin walls and partitions should be of incombustible construction, preferably of reinforced concrete if materials subject to heating are stored in the area. Installation of numerous wood partitions, platforms, galleries and the like can lessen the fire safety of the incombustible structures even though the contents themselves are not flammable. Bituminous coated sheet metals should be avoided where the use of an incombustible building is indicated.

Smaller Buildings

Separate, well-segregated, smaller buildings should be provided for the miscellaneous shops, garages, locker rooms and other appurtenant occupancies usually associated with this type of operation. This should apply as well for bag storage or bag washing (especially if nitre bags are handled rather than destroyed) and for bag printing operations unless printing is no more than a single press operation. The separate building requirements should be adhered to with respect to any amount in excess of a one day supply of the specific types of fertilizer materials known as Class "B" (fish scrap and meal, goat and sheep manure, linseed meal, etc.) and Class "C" (garbage tankage, lime, nitrates, bulk wool waste, etc.) unless incombustible bins or bagged and segregated storage can be provided.

Bins should be of masonry with incombustible tops in the case of Class "C" materials. Good, easily erected, relatively inexpensive, all-metal buildings in a wide range of standardized sizes now are produced which, if properly spaced, afford excellent storage facilities.

Where space limitations are important it is to be remembered that many of the smaller separate buildings suggested can be segregated from each other or from a main building by appropriate masonry fire walls.

Fire Precautions

Equipment, such as electrical devices of all kinds, automotive equipment for use inside buildings, and heating facilities should be chosen with the specification that it conform to Underwriter's standards for location and use contemplated.

Electric wiring and devices should in all respects meet the minimum requirements of the National Electrical Code and wiring should be in the continuous conduit, metal molding, or raceways, unless there is no low resistance ground available.

Combustibles may be ground, in some cases, and finely divided materials present special fire or explosion hazards. Carbonaceous or nitrogenous materials, combustible in the dry natural state, present substantially increased hazard when ground or as dust. Such an operation should be conducted in a segregated section, in tight equipment to confine dust, and with adequate dust removal equipment to deposit dust in outside collectors.

Magnetic protection should be provided ahead of grinders to keep tramp iron from causing sparks and open heating and electrical equipment should be excluded from the immediate area.

Automotive equipment for use in any building with combustible contents including bagged materials should be Underwriter's approved for such use, the chief requirement being a special type muffler to guard against passing flames or sparks. Separate storage should be provided for vehicles, out of the main plant area or properly cut off therefrom. Safe, remote gasoline-filling is essential.

Heating by steam or hot water is preferred and should be no problem in new plant design since by general industrial standards, the requirements for heat in the average fertilizer plant are relatively small. Automatic Underwriters' approved oil, gas and coal fired units and rather simple specifications for their installation are available.

The heater room should be separate or cut off by blank walls with outside entrance and with reinforced concrete ceiling if in a basement or multi-storied section.

Elevating and conveying equipment should be of incom-

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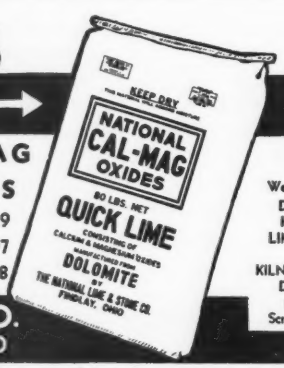

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bustible construction throughout, except for any belting in belt-type conveyors or pulley-driven systems. Elevator boots should be in readily accessible locations and heads or boots should preferably have other than wooden pulleys.

Outside Protection

As to fire protection, greatest single deficiency charged against fertilizer plants, as a group, is the deficiency in or total absence of outside fire protection. Two of the most recent fires classed as large loss disasters in fertilizer plants resulted in extensive destruction because of their location outside city limits, in areas beyond hydrant protection and requiring excessive hose runs by the City Fire Department. Enhanced exterior protection is vital to the average plant with its excessive combustible construction. It is a necessary adjunct to a modern fire-resistive type plant which, although designed for maximum resistance to, and limitation of, fire will still have numerous fire possibilities where adequate water will be welcome in emergency. In addition, proper exterior protection may reduce by half the fire insurance premium that would apply to an unprotected plant, and can be a factor in the securing of complete insurance coverage.

If a plant is within or near a city having a good public water supply, extension of that supply to serve properly located hydrants about the premises will afford the best and most common primary supply, and the least costly. A secondary supply is advisable and should be a requirement unless the plant is small, of good construction and not seriously exposed. Most often, industrial plants plan independent fire protection systems, sometimes of necessity because of location and frequently to avoid placing entire dependence upon a public facility.

In any event there should be a primary supply maintaining continuous pressure on the system. In the absence of a reliable and feasibly accessible public water supply a gravity tank or elevated reservoir may be used to supply adequate pressure and capacity.

As a secondary supply to either public water or an elevated tank reservoir, or as a booster where ample water is available but at low pressure, a private fire pump is ideal. Centrifugal pumps of approved fire service design, powered by electric motors, internal combustion engines, or steam turbines, with suction capacity adequate for the circumstances are in common use.

Sprinklers Effective

Automatic sprinklers constitute the best and most reliable fire protection means. In effect they constitute a nozzle long enough and crooked enough to reach the seat of the fire and are ready for instant action at all times with limited water damage.

When construction is fire-resistive or incombustible and contents are not flammable, sprinklers generally are omitted in well protected plants but where existing properties are of combustible construction or have combustible occupancies, automatic sprinklers constitute the only effective means of overcoming the hazard of fire and the attendant complications.

One hose stream discharges water equivalent to ten or more sprinklers, whereas five sprinkler heads or less extinguish 73 per cent of reported fires under automatic sprinkler protection; hence the favorable regard with which sprinklers are held by Underwriters and protection men.

In addition, new types of automatic sprinkler heads are becoming available that will in a majority of cases prove even more effective, or require less water than present designs. This will, in the near future, permit reconsideration of certain instances where automatic sprinkler installations were considered unfeasible.

Each sprinkler installation is a specific problem of engineering and installation which should be left to experts in that field. Such systems, including water supplies and alarms, should be considered, approved and installed on competent advice, with full cooperation of the interested Underwriters' representatives.

Standpipe, Inside Hose

Standpipe and inside hose rank next to automatic sprinklers for inside fire control and where water supply is available should always be considered. Frequently water supply may be inadequate for a sprinkler system or a standard yard hydrant system, yet may be sufficient for a standpipe installation especially of the size to supply 1½-inch hose for first aid use. Such connections may also be made to sprinkler equipment when taken from not less than 2½ inch pipe on wet systems.

Any layout of inside 2½-inch hose connections should be considered for public Fire Department or plant fire brigade use only, and most locations will be better served by 1½ inch hose connection with properly racked 50-foot to 75-foot lengths of 1½-inch hose, so located that all portions of the premises will be within reach of an effective stream from the nozzle used.

Fire extinguishers should be so located that at the average plant there will be one in each building, on each floor or deck and, where the area is over 2,500 square feet one extinguisher should be provided for each 2,500 square foot area. Additional units should be provided in long narrow buildings or conveyor galleries so that the travel distance to any extinguisher will not be over 50 feet.

They should be mounted or located in readily identified cabinets where they will be immediately accessible when needed, and appropriate types may be placed convenient to specific local hazards, supplementing a general extinguisher installation. Their value is in being where employees can use them to extinguish small fires promptly, without appreciable property loss or danger to personnel. In a large proportion of fires in sprinklered areas, the blaze is extinguished before sprinklers operate. Extinguishers or small hose are frequently used to overhaul fires that have been controlled by automatic sprinklers.

Extinguisher Types

There are several types of extinguishers and variations within some types by different manufacturers. Basically their specification is simplified as to suitability for **A, B,** or **C** type fires, respectively:

Those in ordinary combustibles quenched by cooling, such as wood, paper, cloth;

Those involving paint or oils

where a smothering action is efficient;

Those in electrical equipment where a non-conductive agent is necessary.

The water type, either pump-operated or with the water expelled by a gas cartridge and the familiar 2½-gallon soda-acid type are the most common and effective devices for **Class A** fires. In addition, the pump type and the gas cartridge operated extinguishers may be filled with water in which calcium chloride has been dissolved to prevent freezing in locations where an anti-freeze type extinguisher is required. There is also an anti-freeze cartridge operated type filled with a solution suitable for minor Class B fires as well as Class A fires. In general, these extinguishers have a range of about 40 feet and are effective for one minute.

Various foam, carbon dioxide and dry chemical extinguishers are available for **Class B** fires, the carbon dioxide and dry chemical types also extending their field of usefulness to gas fires and to **Class C** electrical fires. The foam extinguisher is effective on fires in vessels or spills of a few square feet area and the solution has good range, sticking and floating qualities.

Carbon dioxide extinguishers are available in a wide range of sizes, but those containing fifteen pounds of carbon dioxide with a total weight of about fifty pounds are about average for ordinary use. It is the cleanest type to use but must be employed at very short range in relatively still air, and the duration of discharge is short.

The dry-chemical type extinguisher which contains a powder expelled by gas has decidedly better range and fire-killing power than the carbon dioxide extinguishers. It has greater utility on gas, gasoline and oil fires and on hot oils or tars where other agents would cause boil-over. They are also effective on electrical fires and the combined oil electric fires of transformers and other electrical equipment, but their use is not recommended for delicate electrical apparatus where the dust would be a problem on relays or other delicate electrical contact points.

Also effective on small oil or electrical fires is the vaporizing liquid type extinguisher, now chiefly recommended only for small electrical apparatus fires. The familiar one quart pump gun or the ½ to 3 gallon stored air pressure units actuated by valve and short hose have good though limited specific use, but care must be employed in their maintenance and use to guard against the potential personnel hazard of carbon tetrachloride.

Need for Watchman

Watchman service is a badly neglected feature in the fertilizer industry protection facilities. In fact, in the few cases where a watchman is employed little is gained. This is not a job for a superannuated pensioner, a cripple or incompetent.

The watchman, or guard, by whatever name known, is entrusted with the fire safety of the plant during all shutdown periods, generally totalling far more hours than the plant is operating. Aside from perhaps several other duties, the watchman should thoroughly understand ordinary fire hazards, each unusual hazard possibility in the plant, and the correct procedures in event of trouble. He must be able to discover and correct conditions that may cause a fire and know when to summon help.

He must be physically and mentally able, alert, calm and independent. He must be thoroughly familiar with every piece of fire equipment on the premises, including sprinkler system and fire pump operation if such are provided.

Fire Brigade

A fire brigade should be considered a necessity, whether it consists merely of a squad in a small factory or of combined departmental squads constituting a complete fire company in extensive plants. Where necessary, the functions of the fire brigade may be assumed by an enlarged safety team.

Regular full time workers should be trained in fire prevention and fire fighting. These men should know the plant and its hazards thoroughly and be well practiced in the use of the various types of extinguishing devices on the premises. In larger operations several persons will have to be assigned special tasks, such as the operation of fire pumps, alarm and evacuation procedures, shutting off power and gas in affected areas (except power to fire pump) and other performances as required, according to the size of the plant.

If the plant operates on shifts, captains and brigades should be appointed and trained for each shift, so that in general a fire brigade member will be on duty at all times in each section of the plant.

Well trained employes, organized into squads of a few men in each department, may in a few moments on one occasion far more than repay for all the paid time spent in training.

Conclusion

It is evident much improvement is indicated in design features of the average fertilizer plant to assure good construction, equipment and protection features. By means of non-flammable construction and spaces or fire wall segregation of component parts, the loss liability may be greatly reduced. By reducing combustible material to the minimum and limiting areas subject to one fire, it becomes as simple as **"big pile, big fire; small pile, small fire."**

Original plans should contemplate complete protective facilities from water supply to fire brigade, including automatic sprinklers in important combustible buildings or over combustible occupancies, standpipes, extinguishers and watchman service. Substandard existing plants may be worthy of reconsideration of the same protective features and long range planning for improved additional facilities, to afford space or masonry wall fire barriers.

Gradual replacement of inferior construction of equipment can be planned to change completely the plant classification from poor risk to good risk, with benefits accruing additional to better rates, reduced liability and full value insurance coverage.

There is false economy in poor construction and protection. An efficient and lasting plant operation cannot be had without due regard to the excellence or original design, structural features affording safety and adequate subdivision and protection to guard against fire and the hazards it presents. ◆

FERTILIZER MATERIALS MARKET

New York

December 10, 1952

Sulfate of Ammonia

Under an O.P.S. ruling effective Dec. 1, coke oven producers were permitted to raise their prices a maximum of 10 per cent. The new price range is $44 to $49.50 per ton in bulk, f.o.b. various shipping points, with the Pittsburgh area at $44 per ton. Some imported material is being offered at competitive prices.

Nitrate of Soda

Stocks are available at most ports of imported material and a better demand is expected when the spring season opens up.

Ammonium Nitrate

This product still remains scarce and producers are shipping against current production.

Nitrogen Solutions

It is expected that solutions will advance in price $2 to $3 per ton because of the recent advance in the price of sulfate of ammonia.

Urea

This material is in heavy demand both from fertilizer buyers and also industrial buyers. Spot lots of imported material were reported sold at high prices where available, with supplies limited.

Nitrogenous Tankage

Some recent offerings were made for shipment the early part of next year and most producers remain in a sold up condition. Prices range from approximately $5 per unit of ammonia ($6.08 per unit N) for domestic material to $6 per unit ($7.29 per unit N) for imported material.

Organics

Organic fertilizer materials were steady with some buying interest noted. Soybean meal was priced at about $76 per ton, f.o.b. Decatur, Ill. in bulk for December shipment and linseed meal $82 per ton in bulk, f.o.b. Minneapolis. Cottonseed meal was steady in price with some offerings of imported material noted. Tankage was quoted at $7 to $7.25 per unit of ammonia ($8.51 to $8.82 per unit N) f.o.b., Eastern shipping points with blood at about the same price.

Fish Meal

Demand was quiet with feed interests buying sparingly at the present time. While the menhaden season is over in the North, some Southern material was available at ceiling prices. Imported fish meal continued to arrive at various ports with prices ranging from $130 to $132 at the ports.

Bone Meal

Offerings of fertilizer grade were scarce and hard to locate. Raw bone meal is particularly hard to find because of no importations. Feeding bone meal is in good supply but most fertilizer people do not like this grade.

Hoof Meal

With last sales on the basis of $7 per unit of ammonia ($8.51 per unit N), f.o.b. Chicago, no change occurred in this market. Demand is steady.

Superphosphate

Regular material is available at most production points and the production has pretty well caught up with expected demand, unless during the heavy spring shipping season a shortage should develop.

Potash

Producers are making deliveries against existing contracts and are said to be sold out for the balance of the season. The newest producer at Carlsbad started shipments during November. Imported material still is being offered at approximately the same price as domestic at the ports.

Philadelphia

December 10, 1952

The materials market is exceedingly quiet. Prices of sulfate of ammonia and the several forms of liquid nitrogen have been advanced. Packing-house products are weaker and in poor demand. Superphosphate supply is now somewhat ahead of shipping requirements. Potash is moving satisfactorily against contracts and supply is ample.

Nitrate of Ammonia.—Supply of this material continues to be well behind demand.

Sulfate of Ammonia.—Prices have been advanced and the market is fairly strong. Coke-oven grades are priced at $44 to $49.50 per ton at production plants, depending on location. The lower price prevails at a Pennsylvania plant, and the higher in Alabama. Synthetic has been priced by one producer at $49.50. Advances are due to increased costs.

Nitrate of Soda.—Market is firm with material in good supply. The demand is normal for this season of the year.

Blood, Tankage, Bone.—Demand is very quiet with blood holding at $7.75 per unit of ammonia ($9.42 per unit N) in New York area and $8 ($9.72 per unit N) in the Chicago area. Tankage currently is much easier at $7 to $7.25 ($8.51 to $8.82 per unit N) in the East and Chicago $8 to $8.25 ($9.72 to $10.02 per unit N). Bone meal is more or less nominal at $70 to $75 per ton.

Castor Pomace.—A very limited tonnage has been offered at $37.25 per ton at production point.

Fish Scrap.—The season is about over and the market is quite free of demand. Imports of meal thus far this year are indicated as more than double the same period last year.

Phosphate Rock.—Market is fairly

strong with high grade Florida in rather shorter supply than the lower grade.

Superphosphate.—Excess supplies are reported in some areas, but it is expected the supply position will level off when the spring mixing season opens. No price changes are reported.

Potash.—Domestic shipments are said to be moving satisfactorily against contracts; in fact, more freely than for several years.

Charleston

December 10, 1952

Superphosphate supply position continues comfortable and also the position of potash. Two forms of nitrogen have advanced in price within the last ten days.

Organics.—Interest in fertilizer grade organics is relatively quiet with limited supplies of nitrogenous tankage for fall and spring shipment available. Prices for domestic nitrogenous tankage range from $4.60 to $5 per unit of ammonia ($5.59 to $6.08 per unit N), bulk, f.o.b. production points. Offerings of imported nitrogenous tankage are available in limited quantity at around $6.15 per unit of ammonia ($7.48 per unit N), in bags, c.i.f. usual Atlantic ports for fall and early spring arrival.

Castor Pomace.—Current production is available in limited quantity at $37.25 per ton in burlap bags or $2 less in paper bags, f.o.b. Northeastern production points. Imported material varies in price from around $40 to $45 per ton, ex-vessel Atlantic ports.

Blood.—Dried unground blood, in bulk, is indicated at Chicago at approximately $7.50 to $7.75 per unit of ammonia ($9.12 to $9.42 per unit N) f.o.b. Chicago area. The New York market is around $7.75 ($9.42 per unit N) and imported material, in bags, ground, is approximately $7.50 per unit of ammonia ($9.12 per unit N), c.i.f Atlantic ports.

Potash.—Supply position currently is easy and movement steady to contract customers. Very little imported material is being brought in.

Ground Cotton Bur Ash.—This source of potash, primarily in the form of carbonate of potash, is available for prompt and spread shipment at prices approximating the delivered cost of domestic sulfate of potash. Analysis usually is 38 per cent to 45 per cent, averaging about 41 per cent K_2O.

Phosphate Rock.—Trade position continues approximately the same with the market on both high and low grade rock firm.

Superphosphate.—At this time of year, supply conditions are comfortable and as the season progresses, demand will increase for shipment to smaller mixers. Prices continue at ceiling levels.

Sulfate of Ammonia.—Virtually all producers of coke-oven sulfate of ammonia, effective Dec. 1, advanced prices in most cases 10 per cent, f.o.b. production points. One producer of synthetic material, effective Jan. 1, has advanced price $4 per ton at Atlantic ports. Imported material is available at a level of $52 per ton, f.o.b. cars, several Atlantic ports but it is possible this price may also be advanced.

Nitrogen Solutions.—One producer has advanced the price $3 per ton of nitrogen, f.o.b. works, effective Jan. 1.

Nitrate of Soda.—Current stocks of imported material are adequate and are being increased in anticipation of the new season's demand. No change in either domestic or imported nitrate of soda prices has been announced.

Calcium Ammonium Nitrate.—Imported supplies of this form of ammonium nitrate testing 20/21 per cent nitrogen have arrived in limited quantity with further shipments expected during the season through May, at principal Atlantic and Gulf ports. Price is $51.25 per ton f.o.b. cars at ports, packed in 100 lb. paper bags.

Your partners

• • •

are the farm families throughout the nation who buy your products. Many of their production needs are closely related to yours.

Their success in meeting this year's greatly increased food and fiber goals depends to a large extent upon your ability to manufacture and distribute essential supplies of fertilizers and pesticides.

Farm organization leaders, along with their experienced Washington staffs, are constantly presenting factual data on farm operations to key Congressional and Government officials.

Mounting defense production problems clearly show the need for close liaison between leaders in both groups.

It is apparent that you will both make a greater contribution toward a stronger America with a full breadbasket by . . . working together as partners.

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Industrial News

New Products **New Plants** **New Appointments**

Joint Fertilizer Meeting Planned

The advantages of granular vs. pulverized fertilizer will be discussed before several hundred members of the fertilizer industry next month when they meet jointly with college agronomists in Chicago.

The meeting, announced by Z. H. Beers, executive secretary of the Middle West Soil Improvement Committee, is open to all persons interested in fertilizer research.

The meeting is scheduled for Feb. 20 in the Palmer House. Soils specialists from Corn Belt states will report on research projects for finding information on efficient use of plant foods in crop production.

The talk on granular and pulverized fertilizer will be given by Dr. R. L. Cook, of Michigan State College. J. D. Stewart, president of the Improvement committee, will welcome representatives attending the session.

Russell Coleman, president of the National Fertilizer Association will discuss "Disposition of Proposed Future Fertilizer Output."

Other talks include "What Is Research Aiming to Do?" by Dr. W. A. Albrecht, University of Missouri; "Fall Vs. Spring Application of Fertilizer," by J. T. Pesek Jr., Iowa State College; "Effectively Increasing the Use of Fertilizer and Lime," by Dr. L. M. Turk, Michigan State College and "Fertilizer Grades and Ratios Recommendations," by Dr. J. B. Peterson, Purdue University.

Canadians Will Survey Mexican Fertilizer Methods

In an unprecedented move, proving that Mexican industrial techniques are slowly beginning to interest foreign countries, a group of Canadian technicians will go to Mexico for training and study of methods developed there for fabrication of fertilizers.

The Canadians are being sent by the Chemical Construction Company of the United States to the Guanos y Fertilizantes de Mexico plant to gain first-hand knowledge of production techniques employed for ammonia, sulfuric acid and ammonium sulfate. The methods are to be adapted later in the management of a fertilizer plant in Ottawa.

Promoted

Frank G. Moore

Frank G. Moore has been moved up to the post of general traffic manager by Columbia-Southern Chemical Corp.

He has served as traffic manager for the company and its predecessors since 1934.

Associated with the transportation field since 1914, Moore has specialized on traffic problems in the chemical industry for 35 years.

He attended St. Pauls School, Polytechnic Institute and Johns Hopkins University. Moore has been a member of the traffic committee of the Manufacturing Chemists Association since 1919, and has been chairman of the committee twice.

Nitrogen Division Expanding Urea

Expansion of its urea products section is scheduled to get under way this month at the South Point, O., plant of Nitrogen Division, Allied Chemical & Dye Corp.

More than $4 million will be spent on the project, which includes doubling the unit's urea synthesis capacity and installation of facilities for making a pebbled urea fertilizer compound.

Work is scheduled to be completed early next year.

Doubling of urea synthesis capacity will be effected through modification of the present South Point plant to a new process. Developed by Nitrogen Division, the process is said to be more efficient and capable of producing urea of exceptionally high purity. This is required when it is used as a cattle feed supplement and as raw material for manufacture of plastics and other chemical products.

The new production of urea will be made available as a pebbled kaolin-coated fertilizer compound containing 44 per cent plant food nitrogen. It will be free flowing with good storage properties, easily handled in fertilizer distributing equipment and ideally suited for direct application to growing crops, the division reported.

In view of the high concentration of urea Nitrogen Division officials anticipate that the new pebbled urea fertilizer material will be of large benefit to the farmers of Ohio and adjacent states in terms of more crops and greater prosperity.

Orme Elected

Ewell C. Orme has been elected president of Standard Chemical Co., Troy, Ala.

He succeeds E. L. Boatner, who resigned from the position last month.

Industrial News

Pyrenone Formulation For Seeds Is Released

A new Pyrenone formulation for use as a stored seed protectant now is available from U. S. Industrial Chemicals Co. The Pyrenone Seed Protectant is a wettable powder used in slurries to combat insect infestation.

Non-hazardous to warm blooded animals, it can be used freely on seeds which eventually may be prepared for human consumption or processed into animal feeds. Pyrenone does not inhibit germination of the seed.

Tests of Pyrenone Seed Protectant, containing 10 per cent piperonyl butoxide and 0.75 per cent pyrethrins and used at the rate of one pound per 100 bushels, have shown that the material is compatible with common fungicides.

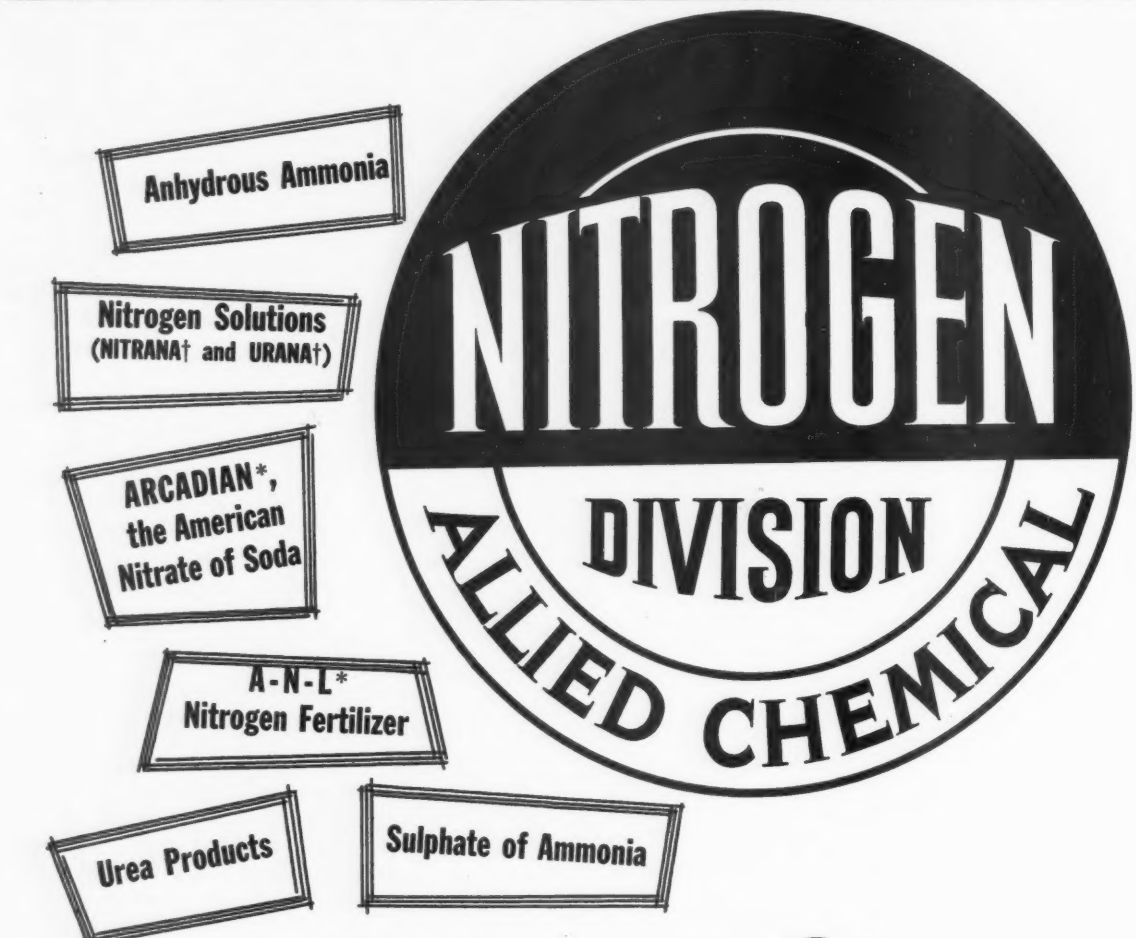
No detrimental effect was found in any germination tests. Seeds used included those of corn, oats, barley, wheat and watermelon.

One Florida company is reported to have been utilizing Pyrenone wettable powder in combination with arasan on watermelon seed for three years. Field tests have shown the adaptability of the formulation, without seed injury, under a wide variety of conditions.

Hans Stauffer Promoted

Hans Stauffer was promoted last month to the post of executive vice president of Stauffer Chemical Co.

Stauffer has been a vice president and general manager of the company since 1941.



*Reg. U. S. Pat. Off.
†Reg. Applied For

Nitrogen Division
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK 6, N. Y.

Richmond 19, Va. • South Point, Ohio • Hopewell, Va. • Atlanta 3, Ga. • Columbia 1, S. C. • San Francisco 3, Cal.

Industrial News

New Herbicide

A new and improved non-selective herbicide called Tumble-Weed 25 is being marketed by the Eston Chemicals Division of American Potash & Chemical Corp. in Los Angeles.

The company reports its product contains 25 per cent sodium chlorate and a minimum of 75 per cent soluble borates plus a wetting and spreading agent.

As a general weed killer it can be applied to both broad-leaf and narrow-leaf weeds and grasses. As a sterilant it has effectiveness for more than a year, the division claims.

Heading the sales program for the new weed killer is Robert Finch, of the Los Angeles office.

Pesticide Act Changes

Changes in a government act affecting pesticide manufacturers were scheduled to go into effect Jan. 19.

The USDA announced modifications in the regulations for the enforcement of the Federal Insecticide, Fungicide and Rodenticide Act. The changes will

1. Establish a method for renewal of economic poison registrations under the act and

2. Clarify provisions relating to permits for economic poisons for experimental work.

The changes are similar to those proposed by the USDA last August. They appear in the Federal Register of Dec. 20, 1952.

OPS Changes Rules

Sellers of all chemicals have been granted a privilege previously restricted to a small group of products. Under the new arrangement chemical sellers may apply for permission to price under the terms of lon -term contracts made before price control instead of present ceilings.

The privilege is authorized by General Over-Riding Regulation 27. Fertilizers and pesticides are included under the new ruling.

OPS said the regulation also will be extended to cover successors to contracts, instead of just contracts made before Jan. 26, 1951.

1-1 'From Pines to Multiwall Sacks'

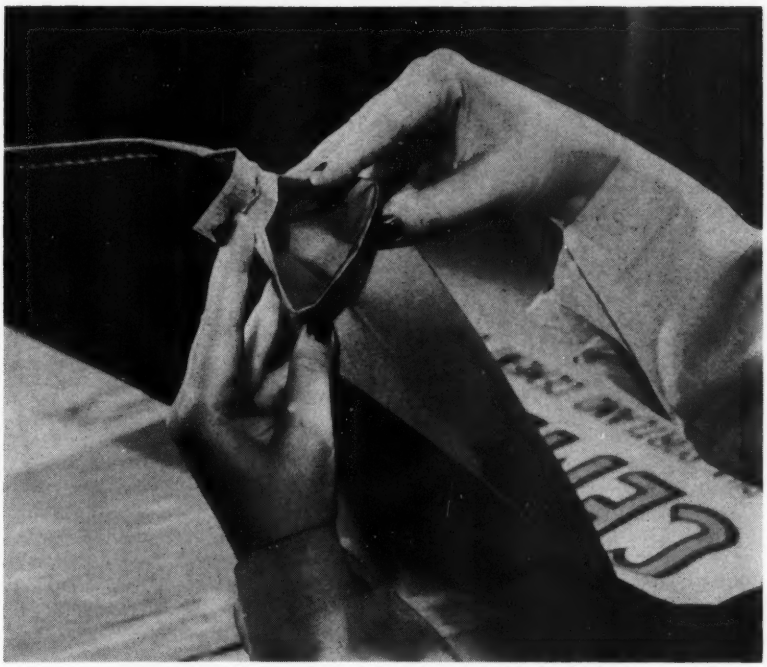


Photo shows worker checking finished multiwall sacks.

If you want to see every step in the manufacture of multiwall sacks, Hudson Pulp and Paper Corp. has a film for the job.

A 33-minute 16mm. documentary in color, the film is entitled "From Pines to Multiwall Sacks."

It tells the story of the manufacture of Kraft paper and its conversion into multiwall sacks. An important feature of the film, which was taken by S. W. Franklin, merchandising director of the company, is that latest equipment is pictured. The picture was taken at Hudson's plant at Palatka, Fla., and it shows all the steps from trees to sacks. Information on film reservations is available. **Code Number 1-1.**

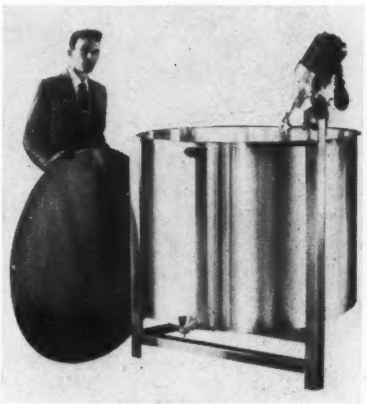
1-2 Chemical Mixing Tanks

New features available in its line of stainless steel chemical mixing and storage tanks are described in a bulletin from Reco Sales Co.

The line is designed for all industrial requirements, wherever high quality and accurate mixing is required, according to Reco.

Chief feature, the company reports, is an inverted air-seal cover which actually floats on top of the tank's contents. Oxidation of liquids over a 90-day period was only one per cent.

The tanks are available in capacities from 10 to 600 gallons and are adaptable for many industrial uses.



New Chemical Tank

An accurately machined, stainless steel, spring-closed spigot is another feature of the tank. **Code Number 1-2.**

Industrial News

Chase Appointee

Edson E. Foster

Edson E. Foster has been appointed advertising and sales promotion manager for Chase Bag Co.

Foster was with Illinois Bell Telephone Co. and the Kemper Insurance Co. prior to his appointment with Chase. He served in the Navy during World War II.

Joins CRAG

Dr. DeWayne C. Torgeson

Dr. DeWayne C. Torgeson has joined the CRAG Agricultural Chemicals research fellowship at Boyce Thompson Institute for Plant Research, Inc. in Yonkers, New York. His appointment was announced by Dr. G. A. Perkins of Carbide and Carbon Chemicals Company, a Division of Union Carbide and Carbon Corporation.

A native of South Dakota, Dr. Torgeson received a B.S. degree in Botany from Iowa State College. He later worked as a graduate research fellow for the Oregon Agricultural Experiment Station. He completed work for his Ph.D. degree in Plant Pathology at Oregon State College last year.

Dr. Bass Joins Little In Consultant Position

A new addition to the staff of Arthur D. Little, Inc., consulting research and engineering firm has been announced.

Dr. Lawrence W. Bass, industrial research representative, has joined the organization to take care of "increasing client demand on the staff for consultation on the effective organization and management of industrial activities."

Dr. Bass served for more than 20 years on the staffs of several industrial concerns and research organizations.

Prior to his association with the Little organization Dr. Bass had most recently been vice president in charge of research for U. S. Industrial Chemicals Company, where he had responsibility for all research and development work on chemicals, insecticides and synthetic resins.

Additional previous experience included supervising the development of new products and processes in the dairy and food field, as director of research for the Borden Company, from 1931 to 1936, and direction of numerous research projects on plastics, textiles and chemicals, as assistant director of Mellon Institute, from 1937 to 1942.

As director of the New England Industrial Research Foundation, during the following two years, Dr. Bass acted in an advisory capacity for numerous companies and trade groups on development of new business, and from 1944 to 1948 he served as director of chemical research for Air Reduction Company.

Promotes Larvacide

George E. Silvera

Sales of Larvacide will be promoted by George E. Silvera, newly appointed technical assistant at Larvacide Products, Inc.

Silvera will promote sales of the product for soil fumigation, methyl bromide and its compounds. He will work out of the company's home office in New York City.

Silvera will spend part of his time in the field and will be available to growers for technical assistance.

He was graduated with honors in 1933 from the Long Island Agricultural and Technical Institute. He received a B.S. degree in Marketing and Vegetable Crops in 1940 from Cornell University.

Magazine Sought

Can you help the oldest agricultural experimental station in the world complete its files of FARM CHEMICALS? **The Rothamsted Experimental station, Harpenden, Herts., England, says it needs a copy of the Feb. 23, 1946 issue of** AMERICAN FERTILIZER **(our former name) to complete its files. If you have a spare copy, please send it to the station or to this magazine.**

Industrial News

Indian Burlap Can Mean Savings, Moncur Claims

Manufacturers can get more for their money than they have received since 1946 if they use burlap from India, according to W. B. Moncur, chairman of the Indian Jute Mills Association.

Moncur said there would be a steady source of burlap supply from India and said New York quotations for the packaging material have dropped in half during the year.

Moncur's statement confirms the earlier report of the recently formed Burlap Council, which in October stated that new interest was developing in burlap bags among United States manufacturers because of abnormally low prices, good supply and presence of ample supplies of jute, the raw material.

As head of a goodwill mission from India, which is visiting the United States to promote closer contact between American burlap consumers and Indian manufacturers, Moncur stressed healthy trade ties between the two countries as the best way to build effective friendship between them.

"Burlap can be called the mutually beneficial key to Indian-U.S. trade," he said. "India is the world's greatest manufacturer of burlap and the United States the greatest consumer. The $90,000,000 worth of burlap Calcutta sold you last year was useful in India's purchase of about $126,000,000 worth of your cotton."

He reported that the combined 1952 Pakistan-India jute crop is the largest in the past 10 years.

"Our combined crop this year will be 12.5 million bales," he said. "The average for the ten years previously was only 7.16 million bales."

Moncur said importance of the United States market and needs of the American consumer were being taken into account by both the Indian Government and the Calcutta burlap mills. The problem of getting Pakistan jute had been alleviated and the Indian mills now had no difficulty in obtaining unlimited quantities of the raw product from Pakistan.

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Industrial News

The Romance of Fertilizer

What do four pretty girls have to do with the farm chemicals industry? It's not the girls we're featuring, but those dolls they made. The toys, being displayed at the 28th annual Girl Scout Gift Festival in St. Louis, were made from cotton dressprint bags manufactured by Bemis Bro. Bag Co. They were distributed at Christmas.

Diamond Alkali Gives Two Men New Positions

Justus U. Belville and Kemble S. Lewis have been given new sales assignments by Diamond Alkali Co. Belville now is staff assistant to J. C. Forsyth, manager of Alkali Specialty Sales at the company's general headquarters in Cleveland. Lewis is assistant manager of Diamond's Chicago branch sales, the position formerly held by Belville.

Belville has a business background which includes experience in both the alkali specialty and general chemicals sales fields. A graduate of Colgate University, he joined Diamond in 1941, doing merchandising and specialty sales and service work in the Pittsburgh, Pa., area.

Lewis has been associated with Diamond since 1947, when he joined the Chicago branch sales office to do technical sales and advisory work on Diamond chemicals for the paint-manufacturing industry. He is a graduate of the University of Michigan with an M.S. degree in Industrial Engineering. He served in World War II as an Army officer with the Chemical Warfare Service and the O.S.S. from 1941 to 1946.

Consolidated Feldspar Sells Out to International

Consolidated Feldspar Corp. sold substantially all its assets to International Minerals & Chemical Corp. in exchange for 108,534 shares of International's Common Stock in late 1952 according to a joint announcement by Louis Ware, International's president and A. J. Fink, chairman of the board of Consolidated.

The agreement contemplates the dissolution of Consolidated following transfer of assets, the assumption by International of Consolidated's liabilities and the distribution of the 108,534 shares of International Common Stock among Consolidated's Common and Preferred Stockholders at the rate of one share of International's Common Stock for each two and one-half shares of Consolidated's Common Stock and two shares of International Common Stock plus a cash distribution for each one share of Consolidated's Preferred Stock.

Swift Co. Markets New Type Vigoro Plant Food

A new, high analysis, water soluble plant food, Instant Vigoro, has been developed by Swift & Company, Plant Food Division. The company said the new Instant Vigoro is a companion product to Vigoro for use by home gardeners, commercial growers, greenhouses and golf courses.

It was developed for either soil or foliage application. Instant Vigoro will be packaged in 8 oz., one-pound and three-pound cans and 25-pound bags.

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Industrial News

Safety Book

"Chemical Spills and Burns", most recent addition to the National Safety Council's safetygraph series, now is available from the council. It emphasizes safe handling and transportation of liquid chemicals as well as the dangers involved.

A visual aid for small group training, the safetygraph consists of 12 spiral-bound 18 x 24 inch pages set in a cover that opens to form an easel. The safety talk is printed on the back surface of the easel and on the front pages are colorful illustrations which add visual interest to the talk.

Included are methods for identifying chemicals; proper means of emptying drums, carboys and tank cars; what to do when a spill occurs and measures to be taken when a worker is overcome by chemical vapors.

Prices may be obtained from the council, located at 425 N. Michigan Ave., Chicago 11, Ill. The safetygraph (No. 22) will be sent on approval for a five day free examination.

Manual Describes How To Unload Sulfuric Acid

The Manufacturing Chemists Association has issued a new manual giving latest recommended practices for unloading sulfuric acid or mixed nitric and sulfuric acids from tankcars.

It is called sheet TC-1 and it differs from the previous edition, issued in 1941, in recommendations for unloading congealed sulfuric acid and oleum.

Safety equipment, unloading equipment and sampling procedure also are described in the booklet. Containing 12 pages, the manual has been prepared by experts in the chemical industry and is one of a series issued by MCA on safe handling of industrial chemicals. Copies may be obtained by writing MCA headquarters, 246 Woodward Building, Washington 5, D. C. Price is 20 cents a copy.

Two Fertilizer Plants Planned for Formosa

Construction of two new fertilizer plants on Formosa have been reported by the Foreign Commerce Weekly. They are designed to boost production from a present total of 138,000 metric tons annually to 438,000 tons.

One plant, in Keelung, will produce 176,000 tons of urea. The other, to be constructed in Hualien, will manufacture 70,000 tons of ammonium nitrate.

Capacity of the Kaohsiung ammonium sulfate plant is being expanded from 7,000 tons to 60,000 tons, the paper reported.

McGrath Follows Howell As Bemis Plant Manager

E. H. Howell retired as manager of the St. Louis plant of Bemis Bro. Bag Co. this month after 44 years of service with the company. He was succeeded by P. C. McGrath, who had been assistant.

Howell

Howell started with Bemis in 1908 as a salesman in St. Louis. He was transferred to Minneapolis in 1917, returning to St. Louis as assistant sales manager in 1919, and becoming manager in 1938. McGrath joined the Bemis company 40 years ago.

McGrath

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MARIETTA concrete stave storage tanks are quickly, permanently erected in any size, any arrangement, to improve your storage operations. Provide large capacity to handle increased output, offer air-tight, moisture-free facilities that keep agricultural chemicals dry, fully protected from fire and the elements. Let MARIETTA engineers design a modern, economical concrete storage system for you to reduce loss of stored materials, give you efficient, profitable storage and handling facilities. Write, wire or phone for their recommendations . . . TODAY!

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Industrial News

FTC To Call Trade Meeting On Conditioners

The Federal Trade Commission has announced its intention to call a trade practice conference on the chemical soil conditioner industry. It probably will not be held before February.'

An official of the FTC said a conference with a small industry committee is to be held in New York this month in preparation for the full scale meeting.

Rules of conduct governing advertising claims, price rebates and other practices usually are the result of such conferences. Once rules are established, failure on the part of a trade member to adhere to them can lead to a formal complaint.

Henry A. Dreer, Inc., producer of Fluffium, was issued a complaint some time ago concerning advertising claims for the soil conditioner. Several other complaints have been under consideration but probably won't be issued now that the conference has been scheduled.

Members of the FTC's Bureau of Industry Cooperation met several weeks ago with representatives of several companies in the field.

The commission announcement stated, in part, "The rapid growth of this industry, together with the keen competition between producers, has led to a number of cases of allegedly false advertising being brought to the attention of the commission."

New Urea Plant

A new urea plant now is in operation at Niihama, Japan. It was engineered and designed by Chemical Construction Co. for Sumitoma Chemical Co. Ltd.

The plant uses a process developed by Chemico to raise yields. It produces both plastic and fertilizer grade urea.

Davidson to Coordinate Relations at Battelle

Relations between Battelle Institute, Columbus, O. and its sponsors of agricultural and biological research will be coordinated by Dr. Richard S. Davidson who recently joined the administrative staff of Battelle.

Dr. Davidson had been a member of the faculty at the Alabama Polytechnic Institute, Auburn, Ala. He is the author of numerous papers based upon his work in plant pathology at both the Ohio Agricultural Experiment Station at Wooster and the Rhode Island Agricultural Experiment Station at Kingston.

Dr. Davidson is a member of the American Phytopathological Society, the Society of American Bacteriologists, the American Association for the Advancement of Science, the American Botanical Society, Sigma Xi and a fellow of the Ohio Academy of Science.

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. . . Serpentine-Fused Phosphate

(*Continued from page 50*)

be the most logical conclusion.

In Taiwan, China, up to August 31, 1952, more than 10,000 metric tons of 18 per cent serpentine-fused phosphate have been marketed and applied almost all for rice. Starting in January 1951, as part of a farmers education campaign, more than 4,000 simple demonstration experiments have been carried out on an island-wide basis. The treatments used are shown in Fig. 3.

The simple experiments have been designed primarily for demonstrating fertilizer efficiency of home-made calcium cyanamide with ammonium sulfate as a check. Fused phosphate and superphosphate fit nicely into the picture and a number of simple comparisons might be made accordingly, e.g., F. P. vs. No P, F. P. vs. Super., A/S + F. P. vs. A/S + Super., and $CaCN_2$ + F. P. vs. $CaCN_a$ + Super., etc.

The tests still are in progress. A preliminary impression from the results of these tests is that under the average soil conditions of Taiwan, China, serpentine-fused phosphate and superphosphate show little, if any, difference in their effect on the yield of rice.

There is some indication that under certain conditions, medium-sized materials may prove to be the most effective (9, 14). This may be true especially for crops with a long growing season and capable of withstanding high soil acidity.

In conclusion, it can be said that the value of serpentine-fused phosphate as a source of plant food has been well established and that on the whole, it is more effective when used in acid soils.

Fig. 3. Treatments of Rice with Serpentine-Fused Phosphate

A/S No P	A/S F. P.	A/S Super.
$CaCN_2$ No P	$CaCN_2$ F. P.	$CaCN_2$ Super.

A/S Ammonium sulfate applied at 80 kg. N/hectare.
$CaCN_2$ Calcium cyanamide applied at 80 kg. N/hectare.
No P No phosphate.
F. P. Serpentine-fused phosphate applied at 80 kg. P_2O_5/hectare.
Super. Superphosphate applied at 80 kg. P_2O_5/hectare.
Notes: Potash is not applied.
Area of each small plot = 100 sq. meters.

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Kickapoo Fertilizers To Start Production Soon

Kickapoo Fertilizers, a division of Midwestern Phosphate Corp., Madison, Wis., is expected to begin mixed fertilizer production by Feb. 15. Facilities for the new plant food producer now are under construction in Hillsboro, Wis.

Former midwest agronomist for Spencer Chemical, James P. Menn has been named sales manager of the company. Menn is a graduate of the University of Wisconsin and, previous to his position with Spencer, worked in the Soil Conservation Service.

Civic leaders of Hillsboro expressed pleasure that the company will locate in that community. John Cesnik, general manager of the Hillsboro and North Eastern R.R. said the company is "making it possible for farmers all over the area to increase their crop production 15 per cent to 25 per cent through the use of fertilizer."

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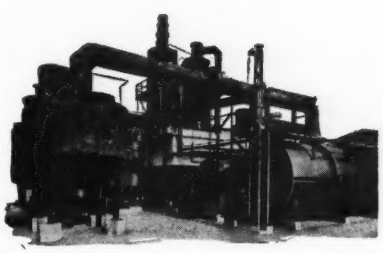

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Industrial News

. . . Good Selling

(*Continued from page 55*)

cannot be said he has any part in "Good Selling." "How can this be accomplished?", you ask. Twenty years ago a large national organization made a survey to determine the reasons why salesmen lose their customers. The reasons, as given by the customers themselves, are as follows:

68 per cent said they changed to other suppliers because of indifference on the part of salesmen.

14 per cent because of unadjusted grievances.

9 per cent because of lower prices elsewhere.

3 per cent customers moved away from the salesman's territory.

1 per cent customers had died.

Please note virtually five times as many customers stopped doing business with this company because of indifference on the part of the salesman than for any other reason. The surprising thing is that another company recently conducted a survey on the same subject and came up with almost identically the same answers.

The 'Little Things'

It is my conviction the things which enable a salesman to hold his customers year after year are what we might call "the little things of life." At the head of this list, I would place simple, sincere attention. All of us want to be paid attention and to be told how good and successful we are, but we insist that this be both sincere and just a little subtle.

Little things like telegrams or cards on birthdays or holidays, hand written notes to express sympathy or to congratulate and genuine interest in a man's family, are some of the big things that go a long way in holding him as a customer.

Expressions of sincere appreciation for a customer's business, not once but many times, pay great dividends. Never degrade a customer by saying, "I sold you so and so." Be more truthful and, at the same time, play up his ego—say, "You purchased from me." Never be indifferent or take any customer for granted.

In conclusion, I would say "Good Selling" is the easiest and most interesting work in the world for a trained man, working as a member of a team, selling a meritorious product and backed up with good service by his company. If one of the links in this chain is weak, "Good Selling" is impossible. It's as simple as that. ◆

New Phosphate Plant

Production of elemental phosphorus at Monsanto Chemical Company's Phosphate Division plant at Soda Springs, Idaho began early in December. Completed on schedule after 18 months of engineering and construction, the plant is expected to produce eight to nine per cent of the total U. S. phosphorus output.

The seventh unit to be placed into operation by Monsanto, it employs the electric furnace process. Operation is under the supervision of J. E. Gurvin, plant manager.

Schramm Named Staff Specialist for Spencer

New staff specialist in the New York City development department of Spencer Chemical Co. is R. W. Schramm.

Schramm was graduated from the University of Notre Dame in 1944 with a B. S. degree in chemical engineering. In 1949 he received a Masters Degree in business administration at Indiana University.

Schramm previously worked four years as a chemical engineer with Carbide and Carbon Chemicals Corporation in Whiting, Ind. He joined the general offices of Spencer in Kansas City in January, 1949 and has been manager of market research for Spencer since April, 1951.

Hilton Resigns

Dr. James H. Hilton has resigned his position as head of the North Carolina State College School of Agriculture to accept the presidency of Iowa State College.

Under his administration the school and its divisions experienced their greatest expansion in the 63 year history of North Carolina State.

Dr. Hilton's major field of research was the relationship of Vitamin A in feeds to the physiological performance of dairy animals and to the Vitamin A content of dairy products.

In 1949 he was selected as "The Progressive Farmer's" Man of the Year. He had been dean of the school since 1948.

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Pittsburgh Agricultural Chemical Co., N. Y. C.

LOADERS—Car and Wagon
Sackett & Sons Co., The A. J., Baltimore, Md.

Buyers' Guide

Classified Index to Advertisers in 'Farm Chemicals'

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Atlanta Utility Works, The, East Point, Ga.
Chemical Construction Corp., New York City
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Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Acidulating
Chemical Construction Corp., New York City
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Ammoniating
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Grinding and Pulverizing
Atlanta Utility Works, The, East Point, Ga.
Bradley Pulverizer Co., Allentown, Pa.
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Atlanta Utility Works, The, East Point, Ga.
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Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Mixing, Screening and Bagging
Atlanta Utility Works, The, East Point, Ga.
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Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Power Transmission
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Superphosphate Manufacturing
Atlanta Utility Works, The, East Point, Ga.
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MAGNESIUM SULFATE
Berkshire Chemicals, New York City

MANGANESE SULFATE
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MANURE SALTS
Potash Co. of America, New York City

MINOR ELEMENTS
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Berkshire Chemicals, New York City

NITRATE OF SODA
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Ashcraft-Wilkinson Co., Atlanta, Ga.
International Min. & Chem. Corp., Chicago, Ill.
Jackle, Frank R., New York City
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PENTACHLOROPHENOL
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PHOSPHATE ROCK
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Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
International Min. & Chem. Corp., Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Virginia-Carolina Chemical Corp., Richmond, Va.
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Monsanto Chemical Co., St. Louis, Mo.
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PLANT CONSTRUCTION—Fertilizer and Acid
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Monsanto Chemical Co., St. Louis, Mo.
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Stedman Foundry and Machine Co., Aurora, Ind.
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McIver & Son, Alex. M., Charleston, S. C.
Potash Co. of America, New York City
Southwest Potash Corp., New York City
United States Potash Co., N. Y. C.

POTASH—Sulfate
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International Min. & Chem. Corp., Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Potash Co. of America, Washington, D. C.

POTASSIUM PHOSPHATE
Monsanto Chemical Co., St. Louis, Mo.

PRINTING PRESSES—Bag
Schmutz Mfg. Co., Louisville, Ky.

PYROPHYLLITE
Ashcraft-Wilkinson Co., Atlanta, Ga.

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Atlanta Utility Works, The, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

SACKING UNITS
Sackett & Sons Co., The A. J., Baltimore, Md.

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Atlanta Utility Works, The, East Point, Ga.
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Sackett & Sons Co., The A. J., Baltimore, Md.

SOIL CONDITIONERS
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SPRAYS
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STORAGE BUILDINGS
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SULFATE OF AMMONIA
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McIver & Son, Alex. M., Charleston, S. C.
Phillips Chemical Co., Bartlesville, Okla.
United States Steel Corp., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

SULFATE OF POTASH—MAGNESIA
International Min. & Chem. Corp., Chicago, Ill.

SULFUR
Ashcraft-Wilkinson Co., Atlanta, Ga.
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Texas Gulf Sulphur Co., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

SULFUR—Dusting & Spraying
Ashcraft-Wilkinson Co., Atlanta, Ga.
DuPont de Nemours & Co., E. I., Wilmington, Del.
U. S. Phosphoric Products Div., Tennessee Corp., Tampa, Fla.

SULFURIC ACID
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
International Min. & Chem. Corp., Chicago, Ill.
Lion Oil Company, El Dorado, Ark.
Monsanto Chemical Co., St. Louis, Mo.
McIver & Son, Alex. M., Charleston, S. C
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U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Virginia-Carolina Chemical Corp., Richmond, Va.

SUPERPHOSPHATE
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Ashcraft-Wilkinson Co., Atlanta, Ga.
Davison Chemical Corporation, Baltimore, Md.
International Min. & Chem. Corp., Chicago, Ill.
Jackle, Frank R., New York City
Mathieson Agricultural Chemicals Co., Little Rock, Ark.
McIver & Son, Alex. M., Charleston, S. C.
Southern States Phosphate Fertilizer Co., Savannah, Ga.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Virginia-Carolina Chemical Corp., Richmond, Va.
Woodward & Dickerson, Inc., Philadelphia, Pa.

SUPERPHOSPHATE—Concentrated
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International Min. & Chem. Corp., Chicago, Ill.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Virginia-Carolina Chemical Corp., Richmond, Va.
Woodward & Dickerson, Inc., Philadelphia, Pa.

TALC
Ashcraft-Wilkinson Co., Atlanta, Ga.

TANKAGE
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
International Min. & Chem. Corp., Chicago, Ill.
Jackle, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

TEPP
Monsanto Chemical Co., St. Louis, Mo.
Virginia-Carolina Chemical Corp., Richmond, Va.

TOXAPHENE
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Monsanto Chemical Co., St. Louis, Mo.
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Monsanto Chemical Co., St. Louis, Mo.
Pittsburgh Agricultural Chemical Co., N. Y. C.

UREA & UREA PRODUCTS
DuPont de Nemours & Co., E. I., Wilmington, Del.
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C

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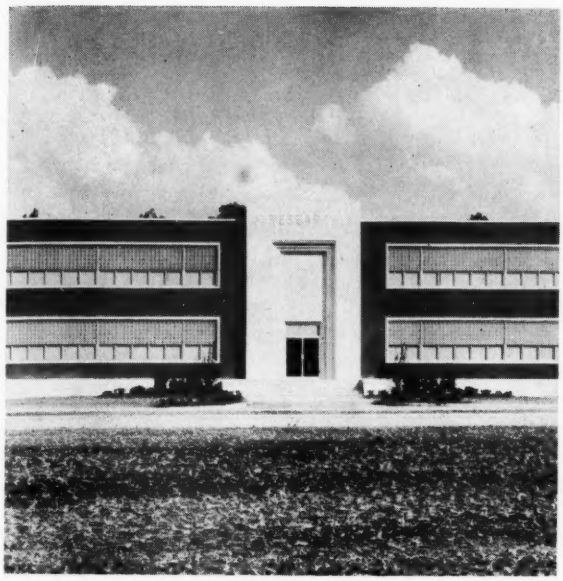
Atlanta Utility Works, The, East Point, Ga.
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.

ZINC SULFATE
Tennessee Corp., Atlanta, Ga.



For better bags:

New Research Lab

BETTER bags for fertilizers and other farm chemicals—that may be one development at the new research laboratory opened late last year by International Paper Co.

The lab, for basic research in development of new pulp and paper grades manufactured from Southern forests, is located in Montgomery, Ala. It cost $400,000 and probably is the most modern and completely equipped pulp laboratory in the South, according to Erling Riis, vice president and general manager of the Kraft Division of the company.

Duplicate Mill Processes

In it scientists will be able to duplicate all mill processes on a small scale, facilitating the company's program of research on highly-specialized pulp grades.

Heading the research department is John W. Gilbert, director, and G. S. Mabrey, associate director of research.

Included in the structure are three pulp pilot plants and labs for chemical analysis, chemical research and physical research. It contains also three controlled humidity rooms and facilities for photographic research and standard pulp and paper testing.

Basic Pulp Problems

Riis said the Mobile Research branch will concentrate on basic pulp research problems of company-wide scope or special work which mill laboratories are not equipped to perform.

Among studies to be carried out are investigations of the effect of wood storage on yield and pulp quality.

The lab is located adjacent to the division offices of International Paper Co. in Mobile. ◆

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. . . Under a Bushel?

"WE'VE got one of the most diversified research programs of any farm chemical manufacturer in the United States . . ."

"Our testing laboratory is equipped with the finest instruments money can buy . . ."

"When our new plant is completed production of fertilizers will be more than doubled . . ."

These statements, and statements like them, are commonplace these days in the farm chemicals industry. They reflect the rapid growth of the industry as well as the vast amounts of money being spent each year to increase the production of fertilizers and pesticides.

But something very important is missing. Where are the products going? Are all farmers aware of the value of plant foods and pest and disease control chemicals? Has the farm public, in short, been educated to the regular use of these products in sufficient quantity and in an efficient way so that the most can be made of our limited acres?

The answer is no.

For, despite the vast amounts of time and money spent annually by the industry, there still are too many men on the land who are either ignorant or indifferent to the value of chemicals for agriculture.

This bottleneck was the stimulus for the recently launched fertilizer and lime utilization program by the USDA. The problem has been given much consideration by agricultural and industrial leaders in recent months.

One reason, of course, was the nearly disasterous season some of the newer pesticide manufacturers suffered last year when insects didn't show up in cotton fields as plentiful as usual.

From another point of view—the relationship of bankers to farmers—the problem has complications, for it is on bank loans that many farmers depend for the capital to purchase the chemicals.

It is this problem—the resistance by far too many farmers in America to new and better farm practices, including the use of fertilizers and pesticides—that stimulated publication of a fascinating booklet entitled "How Farm People Learn New Methods."

The publication, an agricultural committee report from the National Planning Association, was written by Lauren Soth. (The booklet may be obtained from the NPA, 1606 New Hampshire Ave., N. W., Wash., D. C.—50 cents a copy.)

Here's a provocative statement from the booklet:

"Despite the excellence of the production record on the whole . . . there are plenty of indications that many farmers do not adopt newer methods as rapidly as would be profitable and desirable. It is obvious to a casual observer that even in the more progressive farm areas many farmers are not using the best proved practices.

"In other regions, great groups of farmers lag far behind in technology. Many southern farmers are farming the same way their fathers and grandfathers farmed in the 19th century."

But the situation isn't as alarming as it may seem. As the industry has become more and more aware of this basic problem on the farm, it has given more attention to the task of education.

This job of education should continue to be carried out along these lines:

1. Personal visits from county agents, bankers and others who directly affect the farmer, to show them the value of new farm methods and the excellent financial investment which new practices represent.

2. Circulation of films (such as NFA's "Cash In On Corn" and many others) and booklets to give graphic aid to the educational process. This can best and most efficiently be done through industry organizations.

3. Continued research on the core of the problem —reluctance of farmers to accept new methods—by NPA and other organizations to break down the barriers of ignorance and indifference which are a hindrance to farmers, the farm chemicals industry and the nation.

* * *

THE Federal Trade Commission plans to call a trade practice conference for the booming soil conditioner industry.

Probable date for the first conference, with "a small but representative committee of the industry" is February.

Last month FARM CHEMICALS urged, editorially, such a conference to bring stability and integrity to the industry before fly-by-night outfits gave it a permanent black eye.

Purpose of the conference, according to FTC, is to prepare a set of rules of conduct covering advertising claims, price rebates and dealer practices.

When the rules get set up and the conferences under way, advertising claims no doubt will come back to the realm of sanity.

We always suspected soil conditioners wouldn't cure nagging backache, anyway.

—HAMILTON C. CARSON

LEST WE FORGET

Throughout the past year we have talked about Grassland Farming. This pasture program is and continues to be of Prime Importance to all of us in Agriculture.

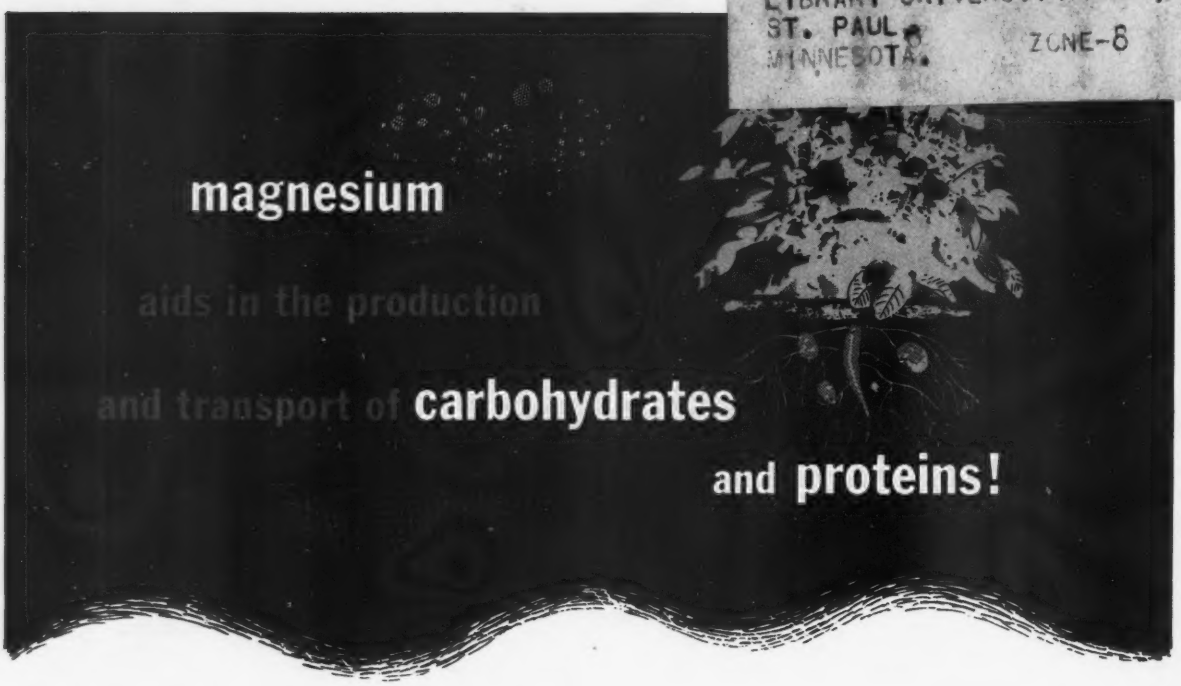
Corn, Cotton, Tobacco, Wheat and other crops are old standbys which we are not forgetting in our zeal to promote Green Pastures.

Potash Company of America will continue to cooperate with the Fertilizer Industry and other agencies to further the cause of all Agriculture.

POTASH COMPANY OF AMERICA
Carlsbad, New Mexico

GENERAL SALES OFFICE...1625 Eye St., N. W., Washington, D. C.
MIDWESTERN SALES OFFICE...First National Bank Bldg., Peoria, Ill.
SOUTHERN SALES OFFICE...Candler Building, Atlanta, Ga.

LIBRARY UNIVERSITY FARM,
ST. PAUL 1,
MINNESOTA. ZONE-8



Include Soluble Magnesium in Your Quality Fertilizers

Sul-Po-Mag®
Water-Soluble
Double Sulfate of Potash-Magnesia

Magnesium is the basic metallic element in chlorophyll, the green plant substance which captures the sun's energy that is vital for life and growth.

Magnesium concentrates in the seed with phosphorus to aid in the formation of oils and proteins required for viable seed.

Magnesium functions as a carrier of phosphates to the actively growing and fruiting parts of the plant.

✻ **Magnesium is required to activate the processes which stimulate the production and transport of carbohydrates and proteins within the growing plant.**

Magnesium, in sufficient quantities, enables the plant to utilize other plant nutrients for healthy, disease-resistant growth.

Magnesium stimulates the growth of soil bacteria and increases the nitrogen-fixing power of legumes.

Growing plants have a complex system in their leaves for producing valuable proteins, sugars and starches. The "machinery" of this system is a series of enzymes. Many of them require magnesium for efficient operations in the growth process. If there is a deficiency of magnesium, the machinery for the production of carbohydrates and proteins slows or stops and the plant starves. Magnesium also aids in the transfer of the starches produced in the plant leaves to the storage organs in stems or roots. This is one reason why storage crops such as beets, onions and potatoes require substantial amounts of magnesium.

Citrus, cotton, grains, legumes, vegetables and many other crops also require soluble magnesium for healthy growth. Where soils are deficient in magnesium, this essential nutrient can be supplied most effectively and economically in soluble form by including *Sul-Po-Mag* in mixed fertilizers. Produced exclusively by *International*, *Sul-Po-Mag* provides a balanced ratio of sulfate of magnesium and sulfate of potash. Both are water soluble and immediately available to crops.

International is stimulating interest of *Sul-Po-Mag* among farmers by national advertising in leading farm publications. You can capitalize on this advertising by using *Sul-Po-Mag* in the complete plant foods you mix for crops grown on magnesium-deficient soils. *Sul-Po-Mag* is bagged for direct application and supplied in bulk for quality mixed fertilizers.

MURIATE OF POTASH
SULFATE OF POTASH
SUL-PO-MAG

Mined and Refined at Carlsbad by International for Fertilizer Manufacturers

POTASH DIVISION

INTERNATIONAL MINERALS & CHEMICAL CORPORATION
General Offices: 20 North Wacker Drive, Chicago 6